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Losses in Shipping Ohio Livestock

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SUMMARY

This study on livestock losses was made at the Cleveland Stock Yards over the twelve-month period from October 1, 1926 to September 30, 1927.

During the period of the study 13,704 cars arrived, which carried 118,709 cattle, 128,788 calves, 726,394 hogs, and 458,999 sheep, page 4.

A large percentage of the livestock marketed at Cleveland came from Ohio—53.8 percent of the cattle, 73.1 percent of the calves, 78.9 percent of the hogs, and 93.4 percent of the sheep.

The cripple and death losses on arrival by railroad amounted to $57,068.82, or $4.15 per car. The truck losses amounted to $2,049.35 and the death and cripple losses in the yard totaled $22,383.06. The grand total of all losses for the period was $81,510.23, page 8.

The Cleveland market was typical of the eastern markets, and the losses, with few exceptions, did not differ greatly from the other eastern markets, page 10.

The death loss of hogs and sheep and the cripple loss of hogs showed the greatest variation from year to year and season to season, page 15.

Of the cars that arrived from Ohio shipping points with losses (either cripples or dead or both), slightly more than 50 percent had losses under $10 and only slightly more than 5 percent had losses between $15 and $20, page 18.

Of the cars from Ohio with crippled animals in them, 73 percent had only one crippled animal to the car, page 20.

Of the cars from Ohio with dead animals in them, 70 percent had only one dead animal to the car.

The cripple and death losses on the average were higher in single deck cars than in double decks, page 21.

The cripple and death losses of hogs and the death loss of sheep were higher in the partitioned cars, page 23.

Cars carrying more than one species of livestock (mixed cars) had, in many instances, higher losses, page 28.

As an average for the period studied shippers who were livestock buyers had the highest cripple loss and the cooperative agencies the largest death loss, page 31.

Most of the crippling occurred within the first twenty hours in transit. During the summer months the longer hogs were in transit, the higher the death loss. This was not so evident during the winter months, page 33.

Transferring cars from one railroad to another did not seem to affect losses to any degree except in the case of hogs. The death loss of hogs was nearly twice as high when the cars were transferred, page 40.

The medium loaded cars had smallest losses. The cripple loss was higher in the light loaded cars and the death loss in the heavy loaded cars, page 43.

Hog losses only were affected by temperature to any appreciable extent. The cripple loss was high in cold weather and low in summer. The death loss was highest for the extremely cold weather and lowest from 30 to 50 degrees. The number of deads then increased for the warmer temperature, page 49.

Footing was not such an important factor in reducing losses, altho cars with good footing had the smallest losses, page 50.

Straw on the average was the best bedding for cool and cold weather and sand for warm and hot weather, page 53.

During the warm and hot weather the hog losses were less in cars that were showered. However, showering had the most influence on bedding other than sand. The sand bedded cars had very low losses even tho they were not showered, page 57.

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The losses for hogs were higher in uncleaned cars; for the other species there was little difference, page 60.

The death loss of hogs was highest among heavy and mixed grades; the cripple loss was highest among the heavy and medium grades, page 61.

The shipment of roughs and stags in cars affected hog losses very little, which showed that they had been properly partitioned and handled, page 62.

For the author's interpretation and conclusions of the study see page 63.

LOSSES IN SHIPPING OHIO LIVESTOCK

A Study of Some of the Factors Causing Death and Cripple Losses in Shipping Livestock to the Cleveland Market

GEO. F. HENNING

INTRODUCTION

Livestock shippers, managers, and members of cooperative livestock shipping associations, the railroads, and the Livestock Loss Prevention Association of Ohio had evidenced interest[1] in the causes for the heavy loss resulting from dead and crippled animals occurring in livestock marketed from Ohio points. With some cooperatives and some privately owned agencies, the amount of this loss was of considerable concern. The Department of Rural Economics cooperated with The Cleveland Union Stockyards Company in securing information which may aid the livestock industry of Ohio in reducing losses.

It was thought at first to study the cause of losses and secure such information on the various factors as is evident at the time of unloading the cars at the stockyards. There are several other factors which contribute to crippled and dead animals, such as feeding, handling by marketing agencies at the farm and in the assembling at the stockyards and railroads, but none of these are included except as was evidenced at time of unloading.

CLEVELAND, A TYPICAL MARKET FOR OHIO LIVESTOCK

A larger percentage of the livestock produced and fattened on Ohio farms is marketed at Cleveland than at any other terminal market.[2] While the total amount of livestock received at Cleveland is not as great as at other markets, yet for the period of the study 13,704 cars, mostly single decks, were received.

[1]This interest was reflected to the extension specialist in livestock marketing of the Rural Economics Department. Some of the agencies manifested interest in securing aid in reduction of livestock losses, there being little information available, it was thought best to secure data pertaining especially to livestock marketed from Ohio shipping points.

[2]Ohio Experiment Station Bulletin 409 "Market Movements of livestock in Ohio," states in 1925 Cleveland received 31% of the hogs, 32% of the cattle, 40% of the calves, and 50% of the sheep sent to terminal markets from Ohio. Pittsburgh, the next most important market for Ohio livestock, for the same period, received 22% of the hogs, 20% of the cattle, 22% of the calves, and 23% of the sheep.

TABLE 1.—Receipts of Livestock at the Cleveland Union Stockyards From All States From Oct. 1, 1926 to Sept. 30, 1927

	Total number of cars	Number of head			
		Cattle	Calves	Hogs	Sheep
Single deck	10,297	99,920	74,355	364,525	163,456
Double deck	3,407	.....	28,707	293,747	212,195
Truck	.....	18,789	25,726	68,122	82,348
Total	13,704	118,709	128,788	726,394	458,999

Cleveland received livestock from a number of states, as will be discussed later, but the larger percentage came from Ohio.

More of the calves, hogs, and sheep than of the cattle came from Ohio. Thus from the standpoint of total receipts[3], amount, and percentage received from Ohio, and the number of counties from which livestock was received, Cleveland was typical and no doubt the best market in which some of the factors causing dead and crippled livestock could be studied.

TABLE 2.—The Percentage of Livestock Arriving at Cleveland by Rail From Ohio From Oct. 1, 1926 to Sept. 30, 1927

	Cattle	Calves	Hogs	Sheep
Single deck	53.8	63.9	82.2	95.1
Double deck	.....	89.2	74.9	92.2
Total, weighted average	53.8	73.1	78.9	93.4

METHOD OF OBTAINING DATA AND DESCRIPTION OF SAMPLE

The period covered in the study was from October 1, 1926 to September 30, 1927, or twelve successive months. During this time 13,704 cars of livestock arrived on the Cleveland market. Some information is kept by the Stockyards Company on every car of livestock that comes to market. However, much that is essential to a study of losses is not kept, but may be obtained as the cars arrive.

An observer[4] was located on the market and from two sources obtained the desired information on the cars upon their arrival. One source of data was the records of the Stockyards Company.

[3] "Receipts" indicates the number of head, and will be so used hereafter unless otherwise stated.

[4] The data were collected on cars as they arrived on the market by Earl K. Jackson, who was formerly a member of The Department of Rural Economics. All data were collected by Mr. Jackson, which made the information obtained more uniform. Credit is also due to him for assistance in preliminary tabulation.

Certain information, such as weight of car, origin of shipment, number of head, number of crippled and dead animals, was kept by the Stockyards Company, on every car of livestock received on the Cleveland market. The information from this source, which pertained to livestock losses[5] was used in the analysis. In some comparisons only the records from Ohio were used, while in others the records from all the states were considered. The records from Ohio were further divided into cars with losses[6], that is, those cars which contained one or more crippled or dead animals or both crippled and dead animals.

The second source of data was random sampling[7]. By this method schedules were obtained by the representative of the Rural Economics Department on the cars as they arrived at the stockyards and at the time of unloading. Only the schedules taken on the cars that came from Ohio were used in the analysis. Schedules taken on cars originating from other states were discarded, for in many instances they were not comparable.

It was not possible in taking the schedules to secure records on a large percentage of the cars that arrived at one time at the unloading docks. A majority of the livestock came in each day on one or two livestock trains. Two unloading crews soon had the livestock in the holding pens, which made it difficult to secure all the information desired. As a result complete schedules were secured on a part only of the total arriving. A more complete analysis of this group of cars is given in Table 3.

Records on 1,001 single deck and 402 double deck cars were analyzed. This group of cars, which made up the Sample[8], represents 13.2 percent of the single deck cars and 14.9 percent of the double deck cars that arrived on the market during the year. It is believed that this sample is fairly representative for the purposes desired in this kind of study.

Of all the cars that came from Ohio, 73.9 percent were singles and 26.1 percent doubles. In the sample, 71.4 percent were singles and 28.6 percent doubles. Thus the sample varied little from the total Ohio receipts in the percentages of singles and doubles.

The last four columns of Table 3 show the percent of singles and doubles for all Ohio cars and for the sample which arrived each month. There was little variation month by month for the number

[5]By "losses" is meant a car containing crippled or dead animals or both.
[6]Hereafter this group of cars will be referred to as "cars with losses".
[7]Schedules were taken upon as many cars as possible. When the schedule on one car was completed the next car which had not been unloaded was sampled and so on thruout the study.
[8]Hereafter this group of cars will be referred to as the "sample".

of singles in the sample as compared to the total, except for the month of June. The biggest variation in numbers of doubles was for December and January. However, with these few variations, the cars on which complete records were obtained were typical for a 12 to 15 percent representative sample.

TABLE 3.—Cars of Livestock Received at Cleveland From Ohio by Months and Cars Upon Which Complete Records Were Taken by Single Decks and Double Decks, From Oct. 1, 1926 to Sept. 30, 1927

Month	Single decks		Double decks		Single decks		Double decks	
	Total	Sample	Total	Sample	Total	Sample	Total	Sample
	No.	*No.*	*No.*	*No.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
October	699	77	222	30	9.2	7.7	8.3	7.5
November	742	79	196	21	9.8	7.9	7.3	5.2
December	632	68	239	19	8.3	6.8	8.9	4.7
January	701	111	290	60	9.2	11.1	10.8	14.9
February	554	90	192	38	7.3	9.0	7.1	9.5
March	650	74	235	39	8.5	7.4	8.7	9.7
April	625	99	241	42	8.2	9.9	9.0	10.5
May	655	80	273	44	8.6	8.0	10.2	10.9
June	640	115	250	37	8.4	11.4	9.3	9.2
July	579	73	164	17	7.6	7.3	6.1	4.2
August	544	67	168	22	7.2	6.7	6.2	5.5
September	583	68	218	33	7.7	6.8	8.1	8.2
Total	7,604	1,001	2,688	402	100	100	100	100

In the group with losses there were 2,463 cars, all of which originated from shipping points in Ohio. Those from outside Ohio were discarded in the analysis. From this group 583 were in the sample and 1,880 were not. The data on those not in the sample were secured from the records of the Stockyards Company. These cars, all of which contained losses were analyzed in order to determine whether there were any conditions different from those in the sample. Thus the 1,403 cars secured at random sampling and the 2,463 cars with losses form the basis of the data in this bulletin.

HOW THE AMOUNT OF LOSS WAS DETERMINED

The value of dead animals was determined by taking the weight and price for that grade less the salvage value which varied from $1.00 to $1.20 per hundred pounds for hogs, $3.00 to $4.00 per head for cattle, $1.00 for calves, and $0.50 for sheep[9].

The price of crippled hogs varied, depending on several factors. All crippled hogs were purchased by one packer who bought them

[9]Dead sheep with wool on had a value of $0.50 per head. Clipped sheep had no value when dead.

at $2.50 per hundred pounds under the market value. This price schedule remained in effect during the period studied. The weight was secured and at $2.50 per hundred was considered the loss value for crippled hogs. The loss on crippled cattle was secured by estimating the value had the animal not been crippled less the price actually received. This same method was followed for calves and sheep.

"Crippled" does not mean the same at all stockyards. In this study any animal unloaded from the cars that was not able to walk to the pens unassisted or was limping or showed evidence of pain was considered crippled. In addition, the following kinds of hogs were considered as yard crips at Cleveland; those with broken legs or split hams, with bad cuts or deep scars, all crampy and slow moving hogs, hogs that appeared to be sick or thumpy, and all "busts" or ruptured hogs. As a result the figure for yard crips was high. In nearly all of the comparisons, which will be discussed later, only crips arriving by railroad were considered.

SIZE OF LOSS

The amount of the loss in this study was determined from the number of crippled and dead animals at the Cleveland market. It does not include the loss resulting from bruises nor from sick or diseased animals when death was known to be due to disease. The number and value of crippled and dead animals, therefore, refers only to the kind of loss just described. The total number of animals, crippled and dead, for all species is given in Table 4.

TABLE 4.—The Number of Crippled and Dead Animals Arriving at Cleveland From All States by Railroad and Truck From Oct. 1, 1926 to Sept. 30, 1927

Arriving	Total number				Number per 10,000			
	Cattle	Calves	Hogs	Sheep	Cattle	Calves	Hogs	Sheep
Dead:								
Railroad	42	124	1,352	1,186	4.2	12.0	20.5	31.5
Truck	6	1	61	61	3.2	.4	8.9	7.4
Yard	.....	.....	143	.....	0	0	1.9	0
Total dead	48	125	1,556	1,247	4.0	9.7	21.4	27.2
Crippled:								
Railroad	68	48	2,800	340	6.8	4.6	42.5	9.1
Truck	.....	.....	.....	1	0	0	0	.1
Yard	.....	.....	4,204	.....	0	0	57.8	0
Total crippled	68	48	7,004	341	5.7	3.7	96.4	7.4

The amount of loss given in Table 5 for crippled and dead animals of all species is $81,500.

For all species of livestock except cattle the value of the death loss was slightly higher than that from crippled animals. The largest amount of loss was for hogs, followed by sheep, cattle, and calves. The order for number of dead and crippled was the same except for cattle and calves. Losses on cattle averaged higher per individual and the smaller number totaled more than the calves.

TABLE 5.—The Value of Crippled and Dead Animals Arriving at Cleveland From All States by Railroad and Truck From Oct. 1, 1926 to Sept. 30, 1927

	Cattle	Calves	Hogs	Sheep	Total
Dead:	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*
On arrival by railroad	1,871.20	1,742.85	27,429.57	7,763.70	38,807.32
On arrival by truck	255.00	18.50	1,334.80	435.05	2,043.35
In yards	.....	.....	2,671.31	.....	2,671.31
Crippled:					
On arrival by railroad	2,436.00	478.75	13,653.75	1,693.00	18,261.50
On arrival by truck	.....	.....	.....	6.00	6.00
In yards	.....	.....	19,711.75*	.....	19,711.75
Total	4,562.20	2,240.10	64,801.18	9,897.75	81,501.23

*All hogs received by railroad or truck which were crippled in the yards were grouped together, the same for dead hogs.

Another difference is noted in the lower loss on trucked livestock. For the period of the study 13.6 percent of the receipts arrived by truck, but the trucked livestock had only 3.5 percent of the total loss. While this loss was much lower than the loss by rail, most of the truck shipments originated within 75 miles of Cleveland. The loss on rail shipments that originated within 75 miles would no doubt be much lower.

The loss from dead and crippled animals was not distributed uniformly over the twelve months. Table 6 shows that January had the largest loss and August the smallest.

However, May and December rank close to January in total dollar loss. One reason for the large amount of loss for these months, which will be brought out in the different analyses, was the heavier receipts at that time.

ESTIMATED LOSS OF OHIO LIVESTOCK AT TERMINAL MARKETS

From the information in Tables 4 and 5 the value of the loss on crippled and dead animals marketed from Ohio may be estimated for the four terminal markets, Cleveland, Pittsburgh, Buffalo, and

Cincinnati. This estimate includes only the livestock marketed from Ohio, for each of these markets received livestock from other states.

TABLE 6.—The Value of the Loss of Crippled and Dead Animals Arriving at Cleveland From All States by Railroad and Truck From Oct. 1, 1926 to Sept. 30, 1928

Month	Truck	Railroad	Total
	Dol.	*Dol.*	*Dol.*
October	76.00	7,810.48	7,886.48
November	119.00	6,224.45	6,343.45
December	90.00	7,939.40	8,029.40
January	152.50	10,545.75	10,698.25
February	48.25	6,446.50	6,494.75
March	303.60	7,349.75	7,653.35
April	468.15	6,616.60	7,084.75
May	349.65	9,201.75	9,551.40
June	97.00	5,587.60	5,684.60
July	147.90	4,220.05	4,367.95
August	156.20	3,247.70	3,403.90
September	41.10	4,261.85	4,302.95
Total	2,049.35	79,451.88	81,501.23

In addition to this amount there was considerable livestock marketed at the smaller Ohio markets and direct to packers, which, if the value were known, would increase the loss value given in Table 5. On the basis of this estimate the loss was approximately $160,000 at the four eastern markets. This loss in nearly all instances was borne either by the shipper or the agencies transporting the livestock to the market. Therefore, these two groups especially are interested in recognizing as many as possible of the factors which contributed to this loss.

TABLE 7.—The Estimated Value of the Loss From Crippled and Dead Animals Arriving From Ohio at Four Terminal Markets for 1927

Market	Cattle	Calves	Hogs	Sheep	Total
	Dol.	*Dol.*	*Dol.*	*Dol.*	*Dol.*
Cincinnati	1,773.75	703.37	36,270.74	1,387.36	40,135.22
Cleveland	2,246.85	1,421.98	49,244.34	8,403.26	61,316.43
Buffalo	768.12	492.98	14,633.45	2,207.39	18,101.94
Pittsburgh	1,032.38	798.13	37,354.08	4,366.67	43,551.26
Total	5,821.10	3,146.46	137,502.61	16,364.68	163,104.85

COMPARISON OF LOSSES AT CLEVELAND AND OTHER MARKETS

Before considering the particular phases of the study, it is interesting to compare Cleveland with Pittsburgh[10], Buffalo[11], and the eleven western markets[12], and to note the variations between these markets (Figs. 1 and 2).

Without exception the death loss of calves at the eleven western markets was two to four times as great as at the eastern markets. The death losses of hogs and sheep were less at the eleven western markets, but the losses of cattle were slightly more than at the three eastern markets. However, the number of dead cattle was small at all markets.

Dead calves showed the only outstanding variation of the several markets. The reasons for this difference are not clear. However, W. J. Embree, chief veterinarian of the Western Weighing and Inspection Bureau, Chicago, offers the following opinion: "About the only explanation we would have to offer would be that perhaps the farmers and dairymen of Ohio keep their calves at home until they are a little older than we do in our dairy states of Wisconsin, Minnesota, and Illinois, from which we receive a great many of our dead calves. In a large percentage of cases the dead calves are very young animals and not in the very best of health. We seem to get a large number of these young, weakly, sickly calves and we believe this is what accounts for our high death rate."

This may or may not be the reason for the high death loss of calves, but it does represent the opinion of a man who is giving his entire time to the study of death losses of livestock.

Data on crippled animals were available only at Buffalo. This loss did not vary greatly between Cleveland and Buffalo for hogs and cattle. The percentages of crippled sheep and calves were much higher at Buffalo.

Thus in comparing Cleveland with the other markets for death losses and only Buffalo for cripple losses, it is found that on the average Cleveland was fairly typical of the other markets.

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[10]The data on the Pittsburgh market were furnished by G. G. Sharpless, traffic manager of the Union Stockyards at Pittsburgh. Total receipts include all livestock which was stopped for feed and water. As a result the number of crippled and dead per 10,000 is less when compared with other markets.

[11]The data on the Buffalo market were furnished by Earl G. Reed, secretary-treasurer of the Ohio Livestock Loss Prevention Association.

[12]The eleven markets are Chicago, St. Louis, Kansas City, St. Joseph, Omaha, Sioux City, St. Paul, Denver, Wichita, Oklahoma City, and Fort Worth. The data from these markets were furnished by the Western Weighing and Inspection Bureau, Chicago, Illinois.

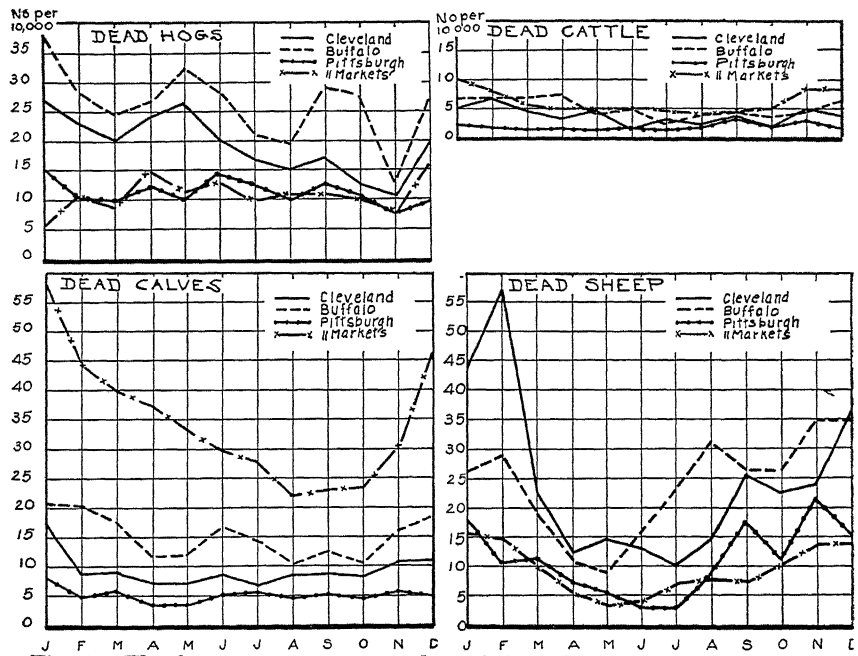

Fig. 1.—The four-year average number of dead hogs, cattle, calves, and sheep arriving by railroad at Cleveland, Buffalo, Pittsburgh, and "11 Markets", 1924 to 1927, inclusive (Tables 46 and 47)

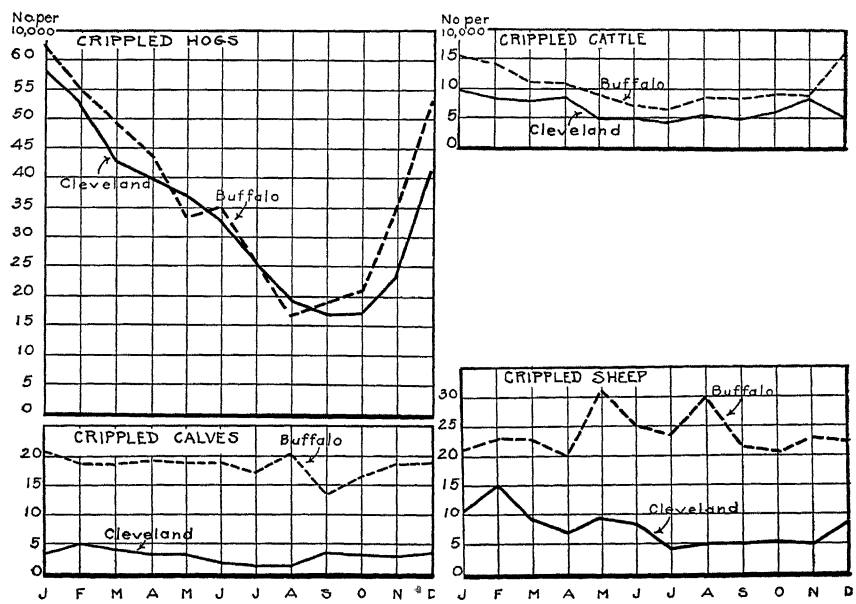

Fig. 2.—The four-year average number of crippled hogs, cattle, calves, and sheep arriving by railroad at Cleveland and Buffalo, 1924 to 1927, inclusive (Table 46)

LIVESTOCK LOSSES BY STATES ON THE CLEVELAND MARKET

Ohio sent more livestock to Cleveland than any other state, but Illinois sent a large number of cattle, principally from Chicago and the East St. Louis markets. Indiana and Iowa were heavy shippers of hogs (Table 8).

Most of the states had smaller losses[13] than Ohio, even tho they are greater distances from Cleveland. This was especially evident for crippled and dead hogs. However, the Ohio losses for cattle, calves, and sheep were lower in many instances. When all states except Ohio were combined as is shown in Table 8, Ohio had the heaviest loss except for crippled and dead calves and dead sheep. The loss on hogs, both crippled and dead, from Ohio was about double that from all other states.

One point should be remembered, however, in such a comparison. When animals are shipped a considerable distance railroad tariffs provide that they must be given a rest, fed, and watered. If any dead animals were in the car, they were removed. It was not always possible to obtain this number when they arrived at market. Hence, the number from other states may be low. Then too, many shipments from other states were from stockyards where they had stopped for sale, but for speculative or other reasons were shipped on to the eastern markets. Many of the animals not able to withstand shipment were either crippled or dead upon arrival at the first stockyards. Then too, most of such shipments were straight carloads of uniform weights. This helped to keep the losses low in comparison to cars originating from shipping points bringing the livestock direct from the farms.

The losses from Indiana and Michigan were lower than those from Ohio in some instances, and higher in others. The conditions in the three states are comparable.

DISTRIBUTION OF LOSSES BY COUNTIES

It is interesting to know the counties in Ohio that contributed the greatest losses. All the cars received from Ohio were tabulated by shipping points, and those containing losses were sorted by counties.

[13]Thruout the bulletin losses are given in numbers per 10,000. If 10,000 hogs are in a certain classification and 20 were found to be crippled, the number per 10,000 is 20. All losses are reduced to the number per 10,000, unless otherwise stated.

TABLE 8.—Crippled and Dead Animals Arriving by Railroad at Cleveland by States From Oct. 1, 1926 to Sept. 30, 1927

State	Receipts				Number per 10,000							
					Crippled				Dead			
	Cattle	Calves	Hogs	Sheep	Cattle	Calves	Hogs	Sheep	Cattle	Calves	Hogs	Sheep
Ohio	50,526	73,158	519,394	351,203	10.4	4.5	47.0	9.1	6.9	11.7	23.0	24.4
Illinois	32,250	7,515	12,037	701	1.8	5.3	13.2	14.2	1.5	11.9	10.8	14.2
Indiana	2,571	4,416	48,976	12,749	15.5	9.0	35.9	6.2	7.7	24.9	16.3	29.0
Iowa	861	178	46,225	0	11.6	0	19.2	*	0	0	5.6	*
Kentucky	2,430	1,010	2	633	0	0	*	0	0	9.9	*	126.3†
Missouri	1,037	6,741	0	0	9.6	2.9	*	*	0	4.4	*	*
Michigan	488	476	5,278	7,825	0	0	26.5	14.0	20.4	0	20.9	51.1
All other	9,757	9,568	26,360	2,540	3.1	5.2	24.3	0	0	14.6	10.6	55.1
Ohio	50,526	73,158	519,394	351,203	10.4	4.5	47.0	9.1	6.9	11.7	23.0	24.4
Other states	49,394	29,904	138,878	24,448	3.0	5.0	25.8	8.2	1.6	12.7	11.4	40.9

*No receipts.
†Only 633 received but 18 were dead, not representative.

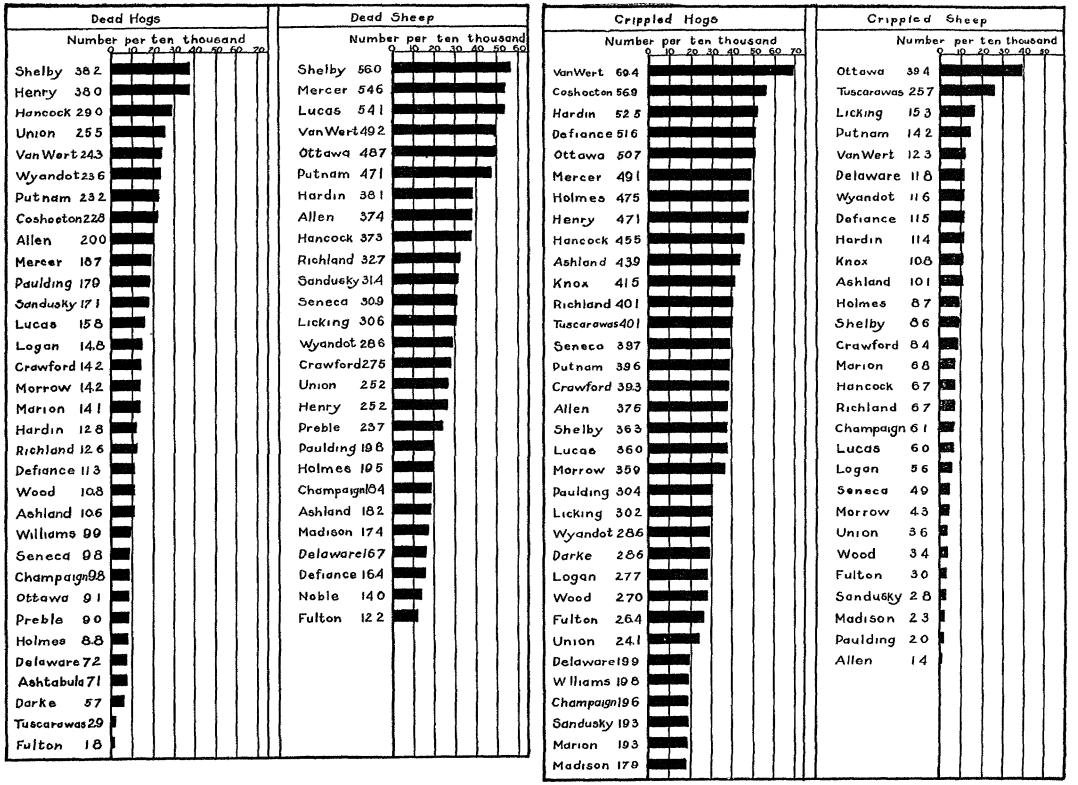

Fig. 3.—Number of dead hogs, dead sheep, crippled hogs, and crippled sheep by counties per thousand arriving at the Cleveland market

The ranking of the counties according to losses is presented in Figure 3. The data for cattle and calves are not given because the losses were low and receipts from many counties too small to be a fair sample. Likewise counties shipping less than 1,000 hogs or sheep to Cleveland were not included in the analysis as it was thought the receipts were too small to be representative.

Some counties were consistently high in losses, Van Wert County was first in crippled hogs, fourth in dead sheep, fifth in crippled sheep and fifth in dead sheep. Shelby County was first in dead hogs and sheep. Other counties ranking within the first ten in two or more kinds of loss were Ottawa, Coshocton, Hardin, Defiance, Mercer, Henry, Hancock, Putnam, Wyandot, and Allen.

VARIATIONS IN LOSS FROM YEAR TO YEAR

When the four years 1924 to 1927 were compared considerable variation was found with some species, as is disclosed by Figures 4 and 5.

Cripple loss.—During the greater part of 1925 fewer hogs and in 1926 more hogs were crippled than in the other years. However, all four years followed the same general trend from month to

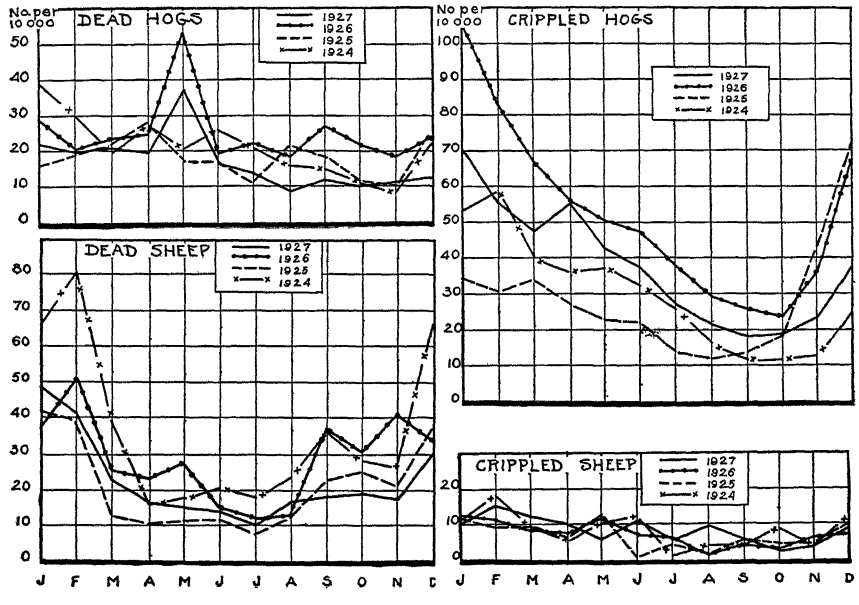

Fig. 4.—Number of dead hogs, crippled hogs, dead sheep, and crippled sheep arriving by railroad at Cleveland compared for the four years, 1924 to 1927 (Tables 48 and 49)

month. Crippled sheep, cattle, and calves showed no outstanding variations between years, except that calves were crippled in greater numbers during the last six months of 1925.

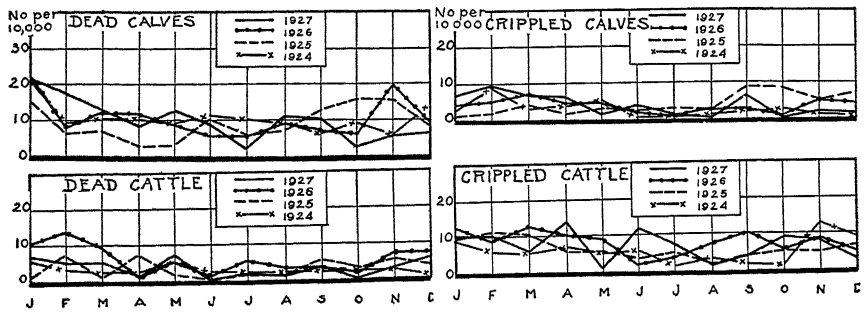

Fig. 5.—Number of dead calves, crippled calves, dead cattle, and crippled cattle arriving by railroad at Cleveland compared for the four years, 1924 to 1927 (Tables 50 and 51)

Death loss.—The death loss was the highest in 1926 for hogs, with a very high peak in May. The loss in May 1927 also was high. Outside of these instances there was no outstanding variation in the four years. The death loss among sheep was heaviest in 1924, but it followed the same general trend as in the other three years. The year 1925 showed fewer sheep dead upon arrival than the other years. The death losses of cattle and calves showed no outstanding variation in any year. Not many cattle and calves arrived dead as compared to the other species of livestock. Only during January of the four years and November 1925 and 1926 were the dead calf losses unusually high.

SEASONAL VARIATION OF LOSSES

In considering the loss from month to month on the Cleveland market, the four years 1924 to 1927[14] were averaged for each species and for the crippled and dead. The weighted average was used. Receipts from all states were included. Figure 6 gives this information for both crippled and dead. The greatest variation in loss from month to month was in crippled and dead hogs and dead sheep.

Cripple loss.—More hogs were crippled than animals of any other species. They too had the greatest variation from month to month, with 58 per 10,000 crippled in January and only 16.6 in September. More sheep were crippled in February than in any

[14]Data for the years 1924, 1925 and part of 1926 were furnished by W A Scranton, joint livestock agent for the railroads at the Cleveland stockyards.

other month, and fewer in July to November, inclusive. Calves and cattle showed little seasonal variation. However, more cattle were crippled in January to April and fewer during the summer months.

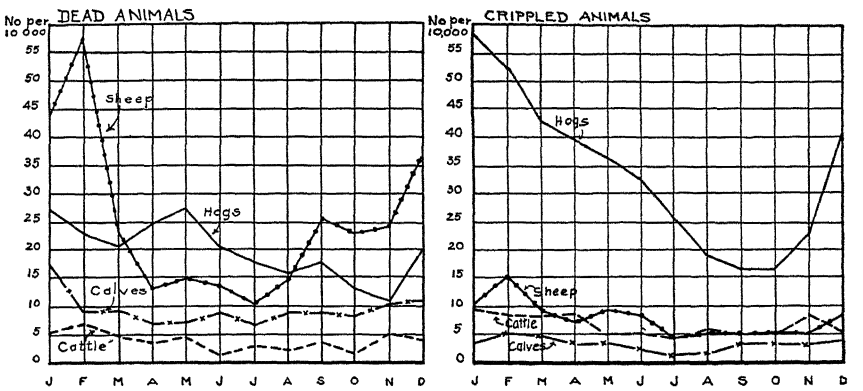

Fig. 6.—The four year average number of dead animals and crippled animals arriving by railroad at Cleveland, by months, 1924 to 1927 (Table 46)

Death loss.—Sheep showed more seasonal variation in death losses than any other species. The losses in December, January, and February were very high, in April to July they were low. Hogs next to sheep had more variation from month to month, with January and May the high months, and November the low month. Dead and crippled hogs followed the same seasonal trend, except for the high point for dead hogs in May.

The first real hot weather usually comes in May, and along with these extremes in temperature a large number of dead hogs. The shippers and railroads do not anticipate soon enough the extreme changes in temperature and as a result in most years a heavy death loss results. This accounts for the high death loss in May.

KINDS OF CRIPPLING OF HOGS

Hogs sent to market are subjected at times to severe strains, caused by sudden stopping and jerking of cars, piling of animals in one end of the car, and slippery and wet floors. As a result of such treatment many are crippled. How they are crippled is presented in Table 9.

Of the number of cripples 67.4 percent were crippled in the hind legs. Next in importance was the condition called crampy, in which the animal is stiff or badly bruised, the muscles are sore and

TABLE 9.—Kinds of Crippling of Hogs of a Representative Group Arriving at Cleveland From Oct. 1, 1926 to Sept. 30, 1927

Where crippled	Number	Percent
Hind legs	337	67.4
Crampy	68	13.6
Front legs	46	9.2
Back	42	8.4
Ham	5	1.0
Shoulder	2	0.4
Total	500	100

do not function normally. Such hogs invariably are sold at a discount. Injury to the hind legs and crampiness accounted for 81 percent of the cripples. Other places of injury were the front legs and the back, being 9.2 and 8.4 percent, respectively. The shoulders were least susceptible to injury.

FREQUENCY DISTRIBUTION IN CARS CONTAINING LOSSES BY VALUE FOR ALL SPECIES

Many cars arrived at Cleveland without any losses. For the period studied, 25.4 percent of the cars from Ohio, and 21.8 percent of all cars contained losses, Table 10.

Slightly more than 25 percent of the cars with losses had losses of less than $5, about the same percentage had losses from $5 to $10. From $10 up the percentage declined rapidly. Only slightly over 5 percent of the cars had losses from $15 to $20, and fewer than 5 percent, except in mixed cars[15], had losses amounting to $20 to $25.

In only 17.9 percent of the Ohio cars with losses, was the loss in excess of $25 and only 3.8 percent had losses over $50. This shows that most of the car losses were of small amounts and only a small proportion had heavy losses.

A slightly greater percentage of heavy losses occurred in the mixed decks.

It was found that 19.2 percent of the mixed decks, and 13.8 percent of the straight decks had losses above $20. This would seem to show a tendency for heavier losses when livestock is shipped in mixed decks.

It is well to remember in connection with this discussion that 28 cars, for example, with a loss of $100 each, is the same as that of 700 cars with a loss of $4 each.

[15]A straight car is one containing only one species of livestock, and a mixed car is one containing more than one species.

TABLE 10.—The Value of Crippled and Dead Animals. Frequency Distribution of Cars From Ohio and Other States at Cleveland Oct. 1, 1926 to Sept. 30, 1927

Loss per car in	Cars from				Cars from				Cumulative percent of cars from			
	Ohio			Ohio and other states	Ohio			Ohio and other states	Ohio			Ohio and other states
	Straight	Mixed	Total		Straight	Mixed	Total		Straight	Mixed	Total	
Dol.	*No.*	*No.*	*No.*	*No.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
0— 4.99	213	504	717	811	30.3	26.3	27.3	27.1	30.3	26.3	27.3	27.1
5— 9.99	210	526	736	843	29.8	27.4	28.1	28.1	60.1	53.7	55.4	55.2
10—14.99	104	223	327	373	14.8	11.6	12.5	12.4	74.9	65.3	67.9	67.6
15—19.99	46	156	202	236	6.6	8.1	7.7	7.9	81.5	73.4	75.6	75.5
20—24.99	33	143	176	205	4.7	7.4	6.7	6.8	86.2	80.8	82.3	82.3
25—29.99	22	99	121	135	3.1	5.2	4.6	4.5	89.3	86.0	86.9	86.8
30—34.99	18	59	77	88	2.6	3.1	2.9	2.9	91.9	89.1	89.8	89.7
35—39.99	17	55	72	80	2.4	2.9	2.8	2.7	94.3	92.0	92.6	92.4
40—44.99	10	22	32	37	1.4	1.1	1.2	1.2	95.7	93.1	93.8	93.6
45—49.99	5	20	25	30	.7	1.0	1.0	1.0	96.4	94.1	94.8	94.6
50—59.99	5	31	36	42	.7	1.6	1.4	1.4	97.1	95.7	96.2	96.0
60—69.99	6	26	32	38	.8	1.4	1.2	1.3	97.9	97.1	97.4	97.3
70—79.99	6	11	17	20	.8	.6	.6	.7	98.7	97.7	98.0	98.0
80—89.99	4	17	21	22	.6	.9	.8	.7	99.3	98.6	98.8	98.7
90—99.99	1	2	3	5	.1	.1	.1	.2	99.4	98.7	98.9	98.9
100 and over	4	24	28	33	.6	1.3	1.1	1.1	100	100	100	100
Total	704	1918	2622	2998	100	100	100	100				

From Table 10, 5.2 percent of the cars with losses from Ohio had losses in excess of $50, but this small number contained approximately 20 percent of the total loss value. Likewise, 75 percent of the cars had losses under $20 but these represented only about 40 percent of the total loss.

DISTRIBUTION OF LOSSES IN CARS CONTAINING DEAD AND CRIPPLED ANIMALS

The frequency distribution of losses in cars just discussed referred to value. For example, if there was one crippled and one dead animal in the car and the loss was $4 and $18, respectively, the combined loss was $22, and was placed in the class group of $20.00 to $24.99. In this discussion crippled and dead animals will be placed in separate classes.

TABLE 11.—Crippled Animals per Car. Frequency Distribution of a Group of Cars Containing Crippled Animals of All Species From Ohio at Cleveland Oct. 1, 1926 to Sept. 30, 1927

Number per car	Cars			Percent of cars			Cumulative percent of cars		
	Straight	Mixed	Total	Straight	Mixed	Total	Straight	Mixed	Total
	No.	*No.*	*No.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
1	355	948	1303	72.4	73.2	73.0	72.4	73.2	73.0
2	92	237	329	18.8	18.3	18.5	91.2	91.5	91.5
3	27	73	100	5.5	5.6	5.6	96.7	97.1	97.1
4	12	23	35	2.5	1.8	1.9	99.2	98.9	99.0
5	3	6	9	.6	.5	.5	99.8	99.4	99.5
6	0	4	4	0	.3	.2	99.8	99.7	99.7
7	1	3	4	.2	.2	.2	100	99.9	99.9
8	0	1	1	0	.1	.1	100	100	100
9	0	0	0	0	0	0	100	100	100
Over 9	0	0	0	0	0	0	100	100	100
Total	490	1295	1785	100	100	100	.....	.....	.....

More than 70 percent of the cars from Ohio that had cripples, had only one crippled animal, and less than 2 percent had four or more cripples. Only a few cars had more than five, and just one car had as high as eight. Many of the animals that are crippled in the early part of their railroad journey die before they reach the terminal market, because they get down and are trampled. Table 12 shows that a large majority of the cars with cripples had only one, two, or three cripples each.

Of the cars containing crippled animals there was little difference in the number of crippled hogs per car between straight and mixed cars; 91.2 percent of the straight and 91.5 percent of the mixed had one or two cripples per car.

The frequency distribution of dead animals corresponded to that of crippled animals, Table 11. While there was less concentration of deads than cripples, in the three lower groups, however, more than 90 percent of the cars arriving with deads had three or fewer per car. As previously pointed out only 1 car had more than seven cripples, whereas, 19 cars from Ohio had eight or more deads and 9 had more than nine to the car, indicating a tendency for a few cars to have a larger number of dead than crippled animals.

TABLE 12.—Dead Animals per Car. Frequency Distribution of a Group of Cars Containing Dead Animals of All Species From Ohio at Cleveland Oct. 1, 1926 to Sept. 30, 1927

Number dead per car	Cars			Percent of cars			Cumulative percent of cars		
	Straight	Mixed	Total	Straight	Mixed	Total	Straight	Mixed	Total
	No.	*No.*	*No.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
1	232	636	868	76.9	68.3	70.4	76.9	68.3	70.4
2	39	166	205	13.0	17.8	16.6	89.9	86.1	87.0
3	15	52	67	5.0	5.7	5.4	94.9	91.8	92.4
4	8	31	39	2.6	3.4	3.2	97.5	95.2	95.6
5	0	10	10	0	1.1	.8	97.5	96.3	96.4
6	4	9	13	1.3	1.0	1.1	98.8	97.3	97.5
7	0	12	12	0	1.2	.9	98.8	98.5	98.4
8	0	9	5	0	.5	.4	98.8	99.0	98.8
9	1	4	5	.3	.4	.4	99.1	99.4	99.2
Over 9	3	6	9	.9	.6	.8	100	100	100
Total	302	931	1233	100	100	100	... .	.....	.. . .

There was almost no difference between straight and mixed decks in cripples, but there was a slight difference in deads. A greater percentage of the straight decks (76.9 for the straight and 68.3 for mixed decks) had one dead per car. Then too, a greater percentage of the mixed cars, 4.8 percent, had two dead per car. These were the outstanding differences between straight and mixed decks. The remaining percentages showed little difference in their variations.

FACTORS AFFECTING LOSSES

SINGLE AND DOUBLE DECK CARS

As previously explained, livestock from Ohio is consigned largely in single decks. It was found that 47,556 calves, 299,368 hogs, and 155,517 sheep were shipped to Cleveland from Ohio points in single decks; while 25,602 calves, 220,026 hogs, and 195,686 sheep were consigned in double decks. Figure 7.

Hogs.—The cripple loss on hogs for single decks and double decks followed much the same general trend for the entire year. However, the single decks were higher for the months of October,

November, December, February, April, May, June, and August. Only during the months of January and September was the cripple loss higher to any extent in double decks. In dead hogs the single decks were higher for every month, except August. During November, December, April, June, and July death losses were more than twice as large in single as in double decks.

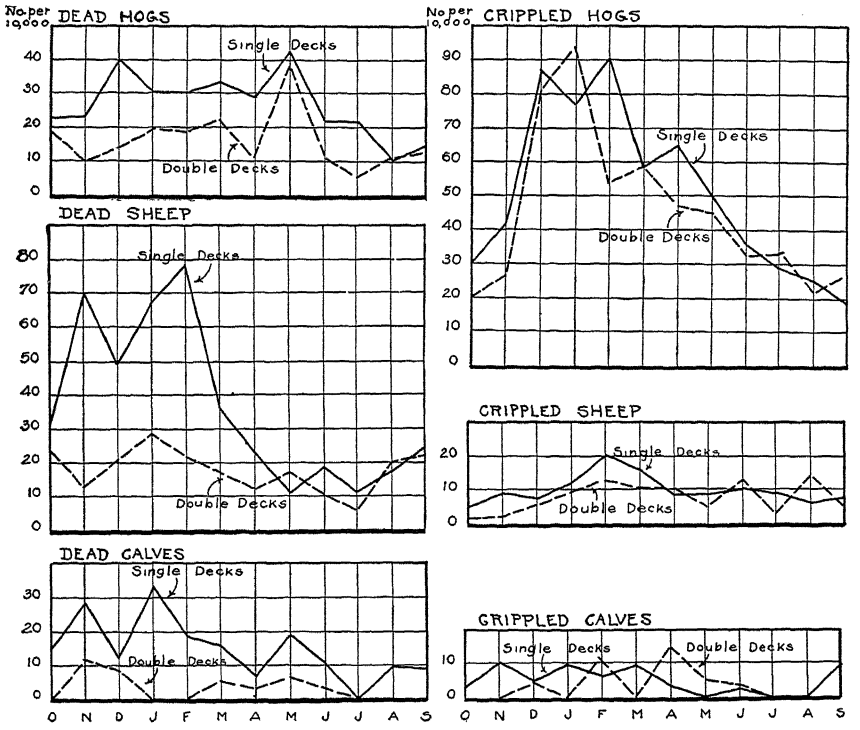

Fig. 7.—The number of dead hogs, crippled hogs, dead sheep, crippled sheep, dead calves, and crippled calves from Ohio shipping points in single and double deck cars to Cleveland, by months from October 1, 1926 to September 30, 1927 (Table 52)

Sheep.—The cripple loss for sheep averaged low for the entire year. The first six months, October to March, inclusive, showed a higher cripple loss in single than in double decks. During the next six months there was no outstanding tendency. The death losses in single decks were much higher for the seven months, October to April, inclusive, and about the same as for double decks the remaining five months. This seems to indicate that for both sheep and hogs single decks will show a higher average loss for cripples and deads than will doubles. The loss in single decks during some

months was higher than in doubles but doubles were never much higher than singles. This points out the fact that shippers should, when possible, use doubles.

Calves.—There was no outstanding difference between single decks and double decks in the cripple loss on calves. Few calves arrived crippled at the market, therefore an analysis would be limited to this small number. With dead calves, the loss in single decks was much higher. Here again the double decks were superior in keeping down losses.

Cattle.—Cattle are marketed in single decks, hence there is no comparison of single with double decks.

PARTITIONED AND UNPARTITIONED CARS

Some cars carrying livestock to market are partitioned, others are not. Railroad tariffs regulate livestock shipments in mixed cars and the use of partitions[16]. Then too, shippers may want their livestock partitioned and sold separately, especially in cooperative shipments. Consequently about one-half of the livestock shipped to Cleveland from Ohio was partitioned. Only 6.9 percent of the partitions were down or partly down in the cars studied (Table 13). The rest were upright and functioning as was intended by the shipper. There was little variation between the single and double deck cars.

TABLE 13.—The Manner of Arrival at Cleveland in a Group of Cars Containing Partitions, From Oct. 1, 1926 to Sept. 30, 1927

Deck	Number			Percentage		
	Up	Part down	Down	Up	Part down	Down
Singles	1093	39	48	92.6	3.3	4.1
Doubles	425	21	5	94.2	4.6	1.2
Total	1518	60	53	93.1	3.7	3.2

Altho most of the partitions arrived in an upright position, not all partitions were strongly built, and some were made from weak material. Table 14 shows that 14.8 percent were weak, 20.6 percent fair, and 64.6 percent strong. Partitions should be strong, thus reducing the chance of their breaking and permitting the livestock to mix, which increases the possibilities for crippling and death.

[16]Hogs and calves, hogs and sheep, cattle and hogs, or any other combination, except cattle and calves, must be partitioned.

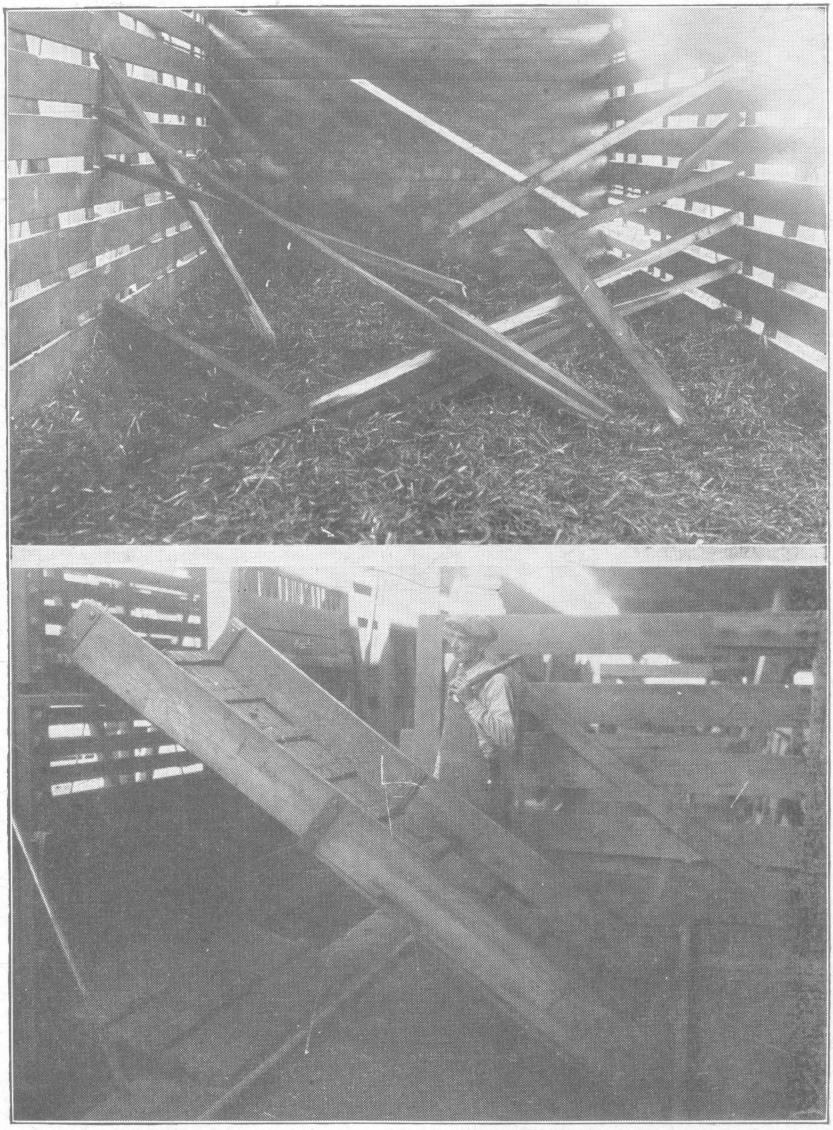

Fig. 8.—The partition shown above was not strong enough, and arrived at Cleveland in this condition. Such partitions increase the possibilities of livestock losses. Below, showing how livestock is unloaded from a double deck car at Cleveland. Livestock in a single deck car walk out on the level

TABLE 14.—The Number and Percentage of Strong, Fair, and Weak Partitions Which Arrived at Cleveland in a Group of Cars Containing Partitions, Oct. 1, 1926 to Sept. 30, 1927

Deck	Number			Percentage		
	Strong	Fair	Weak	Strong	Fair	Weak
Singles	794	242	144	67.3	20.5	12.2
Doubles	260	94	97	57.6	20.8	21.6
Total	1054	336	241	64.6	20.6	14.8

Of this group of partitions, 70.6 percent were well made, 10.1 percent poorly made, and 19.3 percent fairly well made[17] (Table 15). About the same distribution of poorly made partitions was found in the single and double deck cars. Altho 10.1 percent were poorly made and 14.8 percent were of weak material, yet only 6.9 percent came into the market down or part down.

TABLE 15.—The Number and Percentage of Well, Fairly, and Poorly Made Partitions Which Arrived at Cleveland in a Group of Cars Containing Partitions From Oct. 1, 1926 to Sept. 30, 1927

Deck	Number made			Percentage made		
	Well	Fair	Poor	Well	Fair	Poor
Singles	865	190	125	73.3	16.1	10.6
Doubles	287	125	39	63.6	27.7	8.7
Total	1152	315	164	70.6	19.3	10.1

Native boards were used in 71.1 percent, pine boards in 14.1 percent, two-by-fours in 10 percent, and lath, poles, and slabs in 4.8 percent of the partitions.

TABLE 16.—The Number and Percentage of Partitions of Different Material Which Arrived at Cleveland in a Group of Cars Containing Partitions From Oct. 1, 1926 to Sept. 30, 1927

Material	Number			Percent		
	Singles	Doubles	Total	Singles	Doubles	Total
Native boards	849	311	1160	71.9	68.9	71.1
Pine boards	137	93	230	11.6	20.7	14.1
Lath, 1 by 2 inches	35	10	45	3.0	2.2	2.8
Two by fours	126	37	163	10.7	8.2	10.0
Poles	21	.....	21	1.8	.....	1.3
Slabs, 1 inch thick	12	.....	12	1.0	.....	0.7

[17]Partitions were judged upon arrival. The kind of construction, number of boards used, correct nailing of boards were factors in considering a partition well or poorly made.

The most common manner of placing the partitions was straight across the cars, 80.6 percent being so placed and the remaining 19.4 percent at an angle. Sometimes a partition was placed across one corner of a car for a few animals. Some were built slightly longer than the width of the car, making it necessary to place them at an angle instead of straight across the car.

TABLE 17.—The Number and Percentage of Straight and Angling Partitions Which Arrived at Cleveland in a Group of Cars Containing Partitions From Oct. 1, 1926 to Sept. 30, 1927

Deck	Number		Percent	
	Straight	Angling	Straight	Angling
Singles	953	227	80.7	19.3
Doubles	362	89	80.3	19.7
Total	1315	316	80.6	19.4

Partitions were fastened to the sides of the car in various ways; the most common (59.7 percent) was nailing to two cleats, four wires (13.1 percent) was the next, and fastening by the use of four cleats was third, Table 18.

TABLE 18.—The Number and Percentage of Various Ways of Fastening Partitions Which Arrived at Cleveland in a Group of Cars Containing Partitions From Oct. 1, 1926 to Sept. 30, 1927

Fastening	Number			Percent		
	Singles	Doubles	Total	Singles	Doubles	Total
One cleat	2	3	5	0.1	0.6	0.3
Two cleats	762	212	974	64.6	47.0	59.7
Three cleats	9	2	11	.8	.5	.7
Four cleats	115	60	175	9.8	13.3	10.7
One wire	1	0	1	.1	0	.05
Two wires	1	0	1	.1	0	.05
Three wires	0	2	2	0	.5	.2
Four wires	122	91	213	10.4	20.2	13.1
Four or more wires	2	0	2	.1	0	.1
Nailed to side of door	85	65	150	7.2	14.4	9.2
Other fastening	81	16	97	6.8	3.5	5.9
Total	1180	451	1631	100	100	100

Hogs.—The cripple and death loss averaged higher in nearly all instances when cars were partitioned. The crippled-hog loss in cars coming from Ohio as given in Figure 9 was higher in partitioned than in unpartitioned cars for every month of the year, except July and August. The loss of dead hogs was higher every month for the partitioned cars. This loss was greatest in comparison to the unpartitioned cars for the months of November to April.

Sheep.—The greatest difference for all species of livestock between partitioned and unpartitioned cars was found in the case of dead sheep. The months of November, December, January, February, and March are shown in Figure 9. The number of dead sheep taken from cars was greater in partitioned cars for nine months of the year and was very much greater for November, December, January, February, and March. The loss was slightly higher for the unpartitioned cars during October, July, and August. Crippling was greater with sheep in the partitioned cars for all months of the year except two, April and May, when the loss was about the same as in the unpartitioned cars.

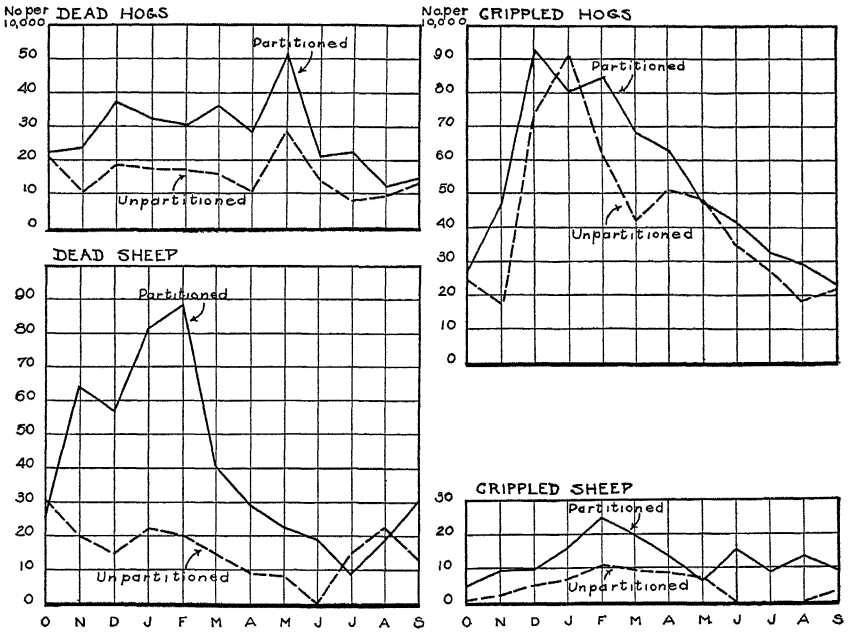

Fig. 9.—The number of dead hogs, crippled hogs, dead sheep, and crippled sheep shipped from Ohio points to Cleveland in partitioned and unpartitioned cars from Oct. 1, 1925 to Sept. 30, 1927 (Table 53)

Cattle and calves.—With cattle and calves no outstanding differences were found between partitioned and unpartitioned cars. However, with crippled cattle the loss averaged slightly higher in the partitioned cars, and the same was true for dead cattle and calves.

Many cars must be partitioned. However, the shipper should use every effort to avoid partitioning sheep and hogs. For example, double decks may be used, the upper deck for sheep and

the lower for hogs. Thus, no partition would be required. In this study death losses of sheep and hogs were much higher in partitioned cars. An increased use of double decks would, no doubt, assist in reducing such losses, not only by eliminating partitions, but from other causes discussed later.

STRAIGHT AND MIXED CARLOADS AND INFLUENCE ON LOSSES

Livestock may be shipped with only one species in a car or with several. However, if more than one species is shipped, a car is mixed altho it may be properly partitioned. In the sample 30 percent of the hogs and 40 percent of the sheep arrived at Cleveland as straight carloads, the rest were mixed.

TABLE 19.—Straight and Mixed Carloads. The Number of Crippled and Dead Hogs and Sheep in the Sample and in the Cars With Losses for the Year Oct. 1, 1926 to Sept. 30, 1927

Species	Singles		Doubles		Total	
	Straight	Mixed	Straight	Mixed	Straight	Mixed
Receipts						
Cars in sample						
Hogs	15,471	33,568	10,610	22,861	26,081	56,429
Sheep	9,542	14,563	12,178	16,291	21,720	30,854
Cars with losses						
Hogs	17,242	62,768	25,236	58,792	42,478	121,560
Sheep	13,009	28,251	18,625	43,855	31,634	72,106
Crippled (number per 10,000)						
Cars in sample						
Hogs	51.06	61.96	69.74	52.93	58.66	58.30
Sheep	8.38	13.05	12.32	12.28	10.59	12.64
Cars with losses						
Hogs	138.61	142.59	112.93	96.10	123.36	119.94
Sheep	25.37	74.33	23.62	21.66	24.34	42.30
Dead (number per 10,000)						
Cars in sample						
Hogs	24.56	43.79	13.20	24.06	19.94	35.80
Sheep	26.20	92.01	14.78	37.44	19.80	63.20
Cars with losses						
Hogs	54.52	84.92	31.70	40.14	40.96	63.26
Sheep	96.86	169.90	43.49	56.09	65.44	100.68

Cripple loss.—The number of crippled hogs was not appreciably different in straight and mixed loads, Table 19. In single decks slightly more crippling occurred among hogs in the mixed decks as shown by both the sample and the cars with losses. In double decks an opposite tendency was found. In both the sample and in cars with losses, the double decks showed higher losses for hogs among straight loads than in mixed loads. Not only were the differences the reverse of those for single decks, but they were of greater significance.

More sheep were crippled in the mixed decks than in straight decks. The cars in the sample showed that one-fifth more losses

occurred in the mixed loads, while among cars with losses about twice as many cripples were found in the mixed loads as in the straight loads. The single decks in the sample showed a decided advantage in favor of the straight loads, while the double decks showed no preference for either straight or mixed loads. (A mixed double deck usually means a straight load of sheep on the upper deck.) In the cars with losses the same relationship held true. The mixed single decks showed a much higher loss from crippled sheep than straight singles, while there was but little difference between straight and mixed double decks.

Death loss.—Practically the same relationship held for dead hogs and sheep as for crippled between straight and mixed loads. However, there were several outstanding exceptions. The death rates of both sheep and hogs in all groups showed that the losses were consistently much higher in mixed than in straight loads. The sample showed that almost twice as many deaths occurred among hogs in mixed loads as in straight loads. Cars with losses showed approximately one-half more deaths in mixed loads than in straight loads. Among sheep the death loss in the sample showed that the ratio for mixed loads was over three times as high as in straight loads. All the cars with losses showed 50 percent more deaths among sheep in mixed loads than in straight loads.

The single decks in practically all cars showed a larger difference in losses between straight and mixed loads than did the double decks. This probably can be explained by the fact that a mixed double deck of livestock contained an appreciable percentage of straight loaded decks.

In conclusion, death of sheep and hogs was much more likely to occur in mixed than in straight carloads. Sheep and hogs were more likely to be crippled in mixed loads than in straight loads, but the hazard was not increased so much in the case of crippling as it was in the case of deaths.

Figures did not show as much in favor of the straight loads over the mixed loads in double decks as in single decks, due to conditions already mentioned. The reverse condition was found in double decks for hogs. More crippling occurred in straight double decks of hogs than in mixed double decks.

The comparison of losses in straight and mixed carloads for summer and winter periods was confined to the losses among hogs and sheep, Table 20. However, the cattle losses were higher in the fall and winter months than during the spring and summer months.

From the ratios given for the year it made little difference in respect to the crippling of hogs or sheep, whether the animals were shipped in straight or mixed carloads; the hogs had a slightly higher rate of crippling in straight cars.

TABLE 20.—Straight and Mixed Carloads. The Number of Crippled and Dead Hogs and Sheep in the Sample by Seasons for the Period Oct. 1, 1926 to Sept. 30, 1927

Season	Hogs		Sheep	
	Straight	Mixed	Straight	Mixed
Receipts				
October, November, December	5,110	12,411	2,329	9,018
January, February, March	5,659	13,690	7,989	11,158
April, May, June	8,221	19,077	5,283	6,882
July, August, September	5,856	11,431	2,608	5,430
Crippled (number per 10,000)				
October, November, December	60.66	62.85	4.29	12.20
January, February, March	111.33	95.69	13.77	16.13
April, May, June	53.52	52.94	9.52	11.62
July, August, September	30.74	27.12	8.67	3.68
Dead (number per 10,000)				
October, November, December	25.44	38.68	8.59	98.69
January, February, March	17.67	27.03	31.29	77.07
April, May, June	15.81	42.46	2.28	27.61
July, August, September	20.49	32.37	15.34	34.99

A division of the data into three-month periods, showed a much higher rate of crippling in both straight and mixed loads during the fall and winter periods, but the difference was constant for the two periods, losses in straight loads being slightly higher during both of these periods. Crippling of sheep was more frequent in mixed loads than in straight loads during the fall and winter period, but was about the same for the straight and mixed loads during the spring and summer months.

Death rates for hogs and sheep showed a tendency to be higher among mixed carloads than among straight carloads. The greatest difference between straight and mixed cars of sheep was found to be during the fall and winter months. The death losses among sheep in mixed loads were more than three times as high as in straight carloads. The spring and summer months did not show such great differences, but even here the death loss of sheep was higher for mixed carloads.

The receipts of cattle and calves were too small to be of much significance when analyzed on this basis.

LOSSES BY AGENCIES MARKETING LIVESTOCK

The sample of cars[18] collected on the market was sorted into the two types of agencies shipping livestock to Cleveland—cooperative associations and livestock buyers. It was possible to use the information secured on all "cars with losses" in the same manner. The ratios (the numbers per 10,000) were much higher in cars containing losses, because cars without losses were not taken into consideration in figuring the ratios, Table 21. The greater numbers of crippled cattle, calves, and hogs in both the sample and cars containing losses were in cars shipped by independent dealers. Crippled sheep averaged slightly higher for the cooperatives than for the independent dealers, in both the sample and cars containing losses.

TABLE 21.—Losses for Cooperatives and Livestock Dealers. The Number of Crippled and Dead Animals in the Sample and in the Cars With Losses From Oct. 1, 1926 to Sept. 30, 1927

	Cattle	Calves	Hogs	Sheep
Receipts				
Cars in sample				
Cooperatives	954	4,662	33,989	21,499
Livestock dealers	1,461	3,546	38,007	30,989
Cars with losses				
Cooperatives	1,555	9,207	59,270	33,841
Livestock dealers	2,705	9,643	70,501	56,462
Crippled (number per 10,000)				
Cars in sample				
Cooperatives	31.7	4.3	53.3	14.0
Livestock dealers	81.6	8.5	62.1	12.3
Cars with losses				
Cooperatives	38.6	13.0	88.9	31.0
Livestock dealers	129.4	23.8	135.3	28.5
Dead (number per 10,000)				
Cars in sample				
Cooperatives	21.0	21.5	45.3	60.5
Livestock dealers	35.3	2.8	30.3	33.6
Cars with losses				
Cooperatives	45.0	41.3	73.9	113.8
Livestock dealers	66.6	35.3	66.4	85.5

With deads the data show just the reverse. The numbers of dead calves, hogs, and sheep were higher for the cooperatives than for the independent dealers; the number of dead cattle was much lower for the cooperatives. From this information it would seem that the managers of the cooperative organizations were not as good as the livestock dealers at keeping down death losses. It has been the general practice of cooperative managers when shipping to load out all livestock received on every shipping date. This means that cars must be loaded heavily at times and in many instances crowded. Livestock dealers more often load cars to the

[18]For definition of "sample" and of "cars with losses" see page 5.

required weight and amount and hold the rest of the stock in the stockyards for the next shipment. It is possible that this difference in loading may account for the higher death losses for cooperatives.

The cripple and death losses for hogs and sheep for cooperatives and independent dealers, by months, are given in Figure 10. The data for cattle and calves were too limited when divided by months to be representative, hence only the information for hogs and sheep is presented.

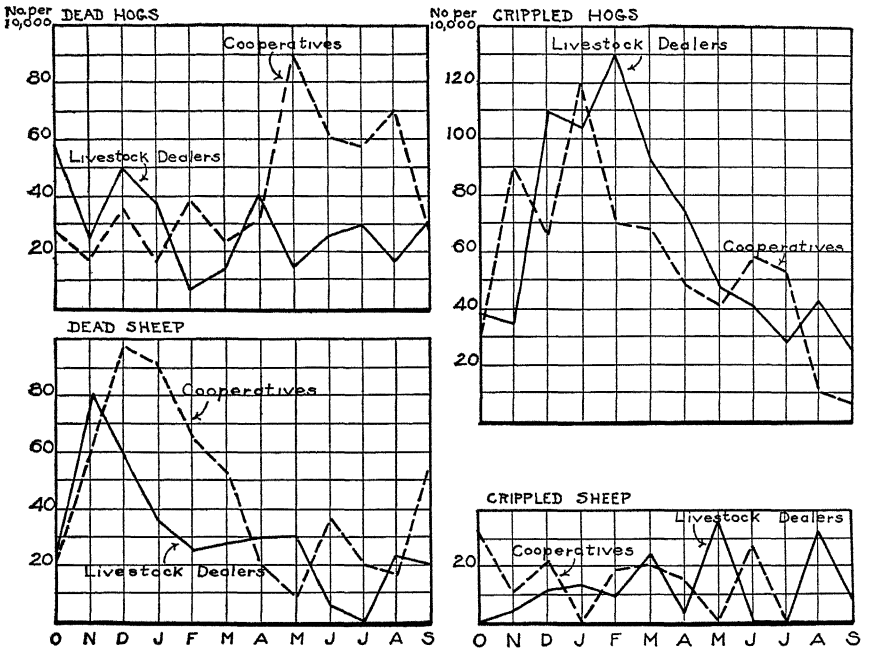

Fig. 10.—The number of dead hogs, crippled hogs, dead sheep, and crippled sheep for the sample group of cars shipped by cooperatives and livestock dealers to Cleveland, Oct. 1, 1926 to Sept. 30, 1927 (Table 54)

The number of dead hogs averaged much higher for the cooperatives during February, May, June, July, and August, while the number during the remaining months, was higher or about the same for the independent livestock dealers. This would seem to show that the independent livestock dealers were much better hot weather shippers of hogs than were the cooperative managers. Losses for the independent dealers were not as great for the summer months in most instances as for the rest of the year.

For dead sheep the losses for cooperatives were decidedly higher during December, January, February, March, June, and September; the losses of the independent livestock dealers were higher during the months of November, April, and May. The other months did not show so much difference.

In the case of crippled hogs, both agencies showed very much the same general tendency, month by month. In some months the cooperatives were high, in other months the independent dealers. For the total of the entire period the cooperatives had lower cripple loss than did the independent dealers, Table 25. This was due principally to the much heavier loss occurring for the independent dealers in December, February, March, April, August, and September. However, the cooperatives had a higher cripple loss for the months of November, January, June, and July than did the independent dealers. Here it would seem that the managers were able to prevent crippling to a greater degree than the independent dealers, for probably both agencies loaded proportionately the same number of cripples. If so, there must be other reasons why loss was greater in one instance for one agency and the reverse in other months. The information on crippled sheep shows no definite tendency. October, November, December, April, and June showed much heavier losses for cooperatives, January, May, August, and September for the independent dealers. The other months showed little variation.

Thus the outstanding variations of losses by agencies were for dead sheep and dead hogs. In both instances the cooperatives seemed to have a much higher loss at particular seasons of the year.

TIME IN TRANSIT

The sample of cars taken upon their arrival at Cleveland was sorted into seven groups, according to the number of hours in transit: The lower group including cars under 14 hours on the road; and then by two-hour intervals up to 24 hours; the last group being made up of all cars on the road more than 24 hours. The cars with losses were sorted in the same manner, Table 22. Three classifications were made. The first grouping was for the fall and winter months, October 1 to April 1; the second from April 1 to October 1, which included the spring and summer months; and the third a combination of the two for the entire year.

Dead hogs.—A study of the data of the sample for the entire year averaged together shows that time in transit up to 18 hours had little influence on the death loss of hogs; but after 18 hours, the loss rose rapidly.

When cars with losses were considered for the entire year the death loss for hogs rose gradually up to 22 to 24 hours, then dropped from 24 to 26 hours, then rose again very abruptly for cars in transit longer than 26 hours. One would expect that the longer cars were in transit, the higher the death loss.

TABLE 22.—Time in Transit. The Number of Crippled and Dead Hogs and Sheep Compared by Six Months Periods From Oct. 1, 1926 to Sept. 30, 1927

Hours in transit	Hogs			Sheep		
	For the year	October to April	April to October	For the year	October to April	April to October
Part 1. Cars in sample						
Receipts						
Under 14	12,173	3,364	8,809	4,476	2,361	2,115
14 to 15:59	12,934	5,395	7,539	11,384	6,811	4,573
16 to 17:59	14,818	5,602	9,222	6,762	6,426	4,336
18 to 19:59	12,215	6,063	6,152	10,192	7,500	2,692
20 to 21:59	13,171	6,197	6,974	10,100	5,814	4,286
22 to 23:59	9,695	5,608	4,087	4,568	3,070	1,498
24 and over	7,652	4,593	3,059	2,642	1,658	984
Crippled (number per 10,000)						
Under 14	37.0	62.4	27.2	15.6	25.4	4.7
14 to 15:59	64.9	107.5	34.5	11.4	13.2	8.7
16 to 17:59	61.4	75.0	53.1	10.2	9.3	11.5
18 to 19:59	60.6	75.9	45.5	9.8	10.7	7.4
20 to 21:59	72.9	88.8	58.8	7.9	6.9	9.3
22 to 23:59	67.0	94.5	29.4	10.9	16.3	.....
24 and over	75.7	76.2	75.1	22.7	30.1	10.1
Dead (number per 10,000)						
Under 14	18.1	35.7	11.4	55.9	76.2	33.1
14 to 15:59	24.0	14.8	30.1	27.2	29.4	24.1
16 to 17:59	23.0	32.1	17.3	35.3	38.9	30.0
18 to 19:59	37.7	54.4	21.1	31.4	38.7	11.1
20 to 21:59	53.9	51.6	55.9	37.6	43.0	30.3
22 to 23:59	39.2	33.9	71.0	65.7	94.5	6.7
24 and over	56.1	41.3	78.4	60.5	78.4	30.3
Part 2. Cars with losses						
Receipts						
Under 14	24,621	6,610	18,008	15,167	9,377	5,790
14 to 15:59	20,874	9,413	11,846	15,795	10,661	5,134
16 to 17:59	21,259	8,350	12,809	15,779	10,417	5,329
18 to 19:59	21,980	10,067	11,913	15,677	10,663	5,014
20 to 21:59	24,971	10,974	13,997	14,066	8,564	5,502
22 to 23:59	18,481	9,461	9,020	8,378	6,389	2,098
24 and over	27,127	13,245	13,880	12,213	8,013	4,200
Crippled (number per 10,000)						
Under 14	108.9	142.2	96.62	28.4	24.5	31.08
14 to 15:59	141.9	180.6	104.67	24.1	25.3	27.15
16 to 17:59	141.6	166.5	126.47	29.8	28.8	31.90
18 to 19:59	121.9	145.0	100.73	28.1	22.5	39.88
20 to 21:59	128.5	150.4	111.45	29.1	31.5	25.44
22 to 23:59	119.6	141.6	96.45	23.8	31.3	4.76
24 and over	138.6	150.2	128.9	24.5	27.4	19.0
Dead (number per 10,000)						
Under 14	39.0	40.8	38.31	84.4	101.3	55.26
14 to 15:59	56.5	55.2	55.71	89.9	112.5	45.94
16 to 17:59	54.6	74.2	42.15	75.4	90.2	46.91
18 to 19:59	61.4	63.6	57.08	95.9	118.2	45.87
20 to 21:59	72.1	61.1	80.73	88.4	114.4	49.07
22 to 23:59	73.6	71.9	75.38	89.0	103.3	42.89
24 and over	79.6	58.8	99.4	108.9	114.8	97.6

When comparing this information for two divisions of the year, October to March with April to October, some differences were found. From October to March, the autumn and winter months, in the sample losses were relatively small under 16 hours. They were highest for the two periods 18 to 20 hours and 20 to 22 hours, but dropped considerably for the two-time groups, 22 to 24 hours and over 26 hours. For the group of cars with losses the same tendency was noted as in the sample for the cars in transit up to 16 hours.

The peak occurred in death losses of hogs in the 16-to-18-hour group, then declined as in the sample and rose to another peak from 22 to 24 hours, then declined for the last two groups. From the data for the autumn and winter months it would seem that the highest death loss was for 16 to 20 hours. After that period the loss did not seem to be influenced very much by time in transit.

In analyzing the April-to-October receipts, which included the spring and summer months, a different tendency was noted. Here the death loss in hogs for the sample was comparatively low for the cars in transit up to 20 hours. After 20 hours the rate of loss rose abruptly for the remaining groups, each one being higher than the preceding one. This general tendency was noted in cars with losses, with three exceptions, but the general tendency was upward. The data from this study seem to show that for spring and summer months the longer cars are in transit the heavier the death loss in hogs.

Crippled hogs.—Time in transit seemed to have had a different effect on crippling of hogs than for dead hogs. Taking first the general average of the sample for the year, it was observed that the crippling loss was the greatest at 24 to 26 hours and then dropped abruptly for the cars in transit over 26 hours. This was true for the cars with losses, as well as for the sample. However, there was a tendency with both groups of cars for the percentage of crippling to be rather high from 14 to 18 hours, followed by a slight drop and then an increase to a peak for 24 to 26 hours. In analyzing the data for the different seasons, a more pronounced tendency was found.

In the receipts from October to March, the autumn and winter months, for the cars with losses, the number of cripples reached the peak in the 14-to-16-hour group and then declined for the remaining hours on the road. In the sample, on the other hand, the crippled loss fell off rapidly and then increased gradually up to 22 to 24 hours, followed by an abrupt drop for the cars in transit

longer than 26 hours. For the fall and winter months the data seem to show that the animals were more susceptible to crippling during the first few hours while in transit. If they were able to withstand the first 16 hours of railroad travel, the amount of crippling was likely to be less.

A different situation was found in the spring and summer, April to October. The number increased with the hours on the road with two exceptions and reached a peak for the 24-to-26-hour period, and then declined rapidly for the longer periods. Both the representative sample and the cars with losses showed a tendency for less crippling for 18 to 20 hours than for 22 to 24 hours. Just why there should be the drop at this particular period is difficult to understand. However, the same general tendency was noticed for October to March, with a drop after the first peak of heavy crippling. There is a possibility that hogs crippled earlier in transit may be dead upon arrival, reducing the number of cripples arriving at the hours 18 to 24. Referring again to the number of dead hogs it was found that the death loss showed a peak from 18 to 22 hours, which corresponds with the low number crippled. This may be the explanation for the lower crippling in the 18-to-24-hour groups.

Dead sheep.—Data for the number of sheep according to the number of hours in transit were somewhat confusing. Taking the average of the sample for the entire year the losses seemed to increase gradually from 14 hours on up to 24 hours and over.

However, the losses were much higher for 12 hours and under than for the period from 14 to 20 hours. This condition was not true in the case of cars with only losses, for here it would seem that the loss had a tendency to increase with the longer time on the road, with the exception of 16 to 18 hours.

When analyzing the data on the basis of autumn and winter months, there did not seem to be any definite tendency. The losses were somewhat higher for the longer time in transit, but the difference was not outstanding. In the spring and summer months, October to April, for the cars with losses the number of dead sheep was high for the 24-hour group. This however, was not true with the sample and the death loss averaged about the same for the other groups. This variation in the losses was probably influenced by other factors than time in transit.

Crippled sheep.—In both the sample and the cars with losses there seemed to be little relation between the amount of crippling and hours in transit. The number of cripples in several instances

was lower for the longer periods in transit than for the shorter periods. This indicates that time in transit was not a serious factor as far as crippled sheep are concerned.

Cattle and calves.—Data on cattle and calves were too limited to be of value for analysis of dead and cripple losses on time in transit.

TIME IN TRANSIT FOR SINGLE AND DOUBLE DECK CARS BY SEASONS

For single deck cars during the fall and winter months there was a slight increase in death loss of hogs as the time in transit increased. The loss in cars with losses was high for 18 to 20 hours, and then dropped off for the 20-to-24-hour groups. However, in the single deck cars hogs in the sample, from April to September, the peak was reached at 20 to 22 hours, with a drop at 22 to 24, and then an abrupt rise for 24 hours and over. The same was true for double decks from April to September, when the loss was much greater for cars in transit 20 hours or longer. The highest loss for double decks from October to March was for 20 to 22 hours. The same was true for cars with losses. Time in transit during this period was not such an important factor as it was from April to September, when for both single and double decks the loss was much greater for cars in transit 20 hours or more, Table 23.

Hogs did not show a tendency for more crippling for the longer period. The high peak in crippling was from 14 to 18 hours, then a drop, then a rapid increase for the longer period of travel. As previously explained, this might be due to the fact that many of the animals crippled early in transit died when on the road for 18 hours or more. Time in transit for the spring and summer months did not seem to have much of an influence for double deck cars. altho the peak occurred in the 20-to-22-hour group, but both the 22-to-24 and 24-and-over groups showed light losses. A fairly heavy loss was noted for the cars that were in transit 13 hours or less. Death loss of hogs averaged lower during the fall and winter months in double deck cars. This was not true for crippling. The crippled loss during this same period was much higher in double deck cars than in single decks. During the spring and summer months crippling was higher for most periods in the single deck cars, being just the reverse when compared to the fall and winter months. However, in the cars with losses only the crippling averaged higher in the single deck cars for October to March, and higher in double decks from April to September, just the reverse of the sample.

TABLE 23.—Time in Transit. The Number of Crippled and Dead Hogs and Sheep by Single and Double Decks Compared by Six Month Periods From Oct. 1, 1926 to Sept. 30, 1927

Hours in transit	Receipts				Number per 10,000							
					Crippled				Dead			
	Oct.—Mar.		Apr.—Sept.		Oct.—Mar.		Apr.—Sept.		Oct.—Mar.		Apr.—Sept.	
	Singles	Doubles	Singles	Doubles	Singles	Doubles	Singles	Doubles	Singles	Doubles	Singles	Doubles
					Part 1. Cars in sample							
Hogs:												
13.9 and under....	1828	1536	5132	4177	43.7	84.6	13.6	40.7	60.2	6.5	15.6	16.8
14—15.9.....	3592	2286	4321	3218	91.8	109.4	39.3	28.0	19.5	4.4	34.7	24.9
16—17.9.....	2675	3927	4958	4364	67.3	61.1	61.7	43.5	48.6	12.7	22.6	11.5
18—19.9.....	3415	2648	4186	1966	2.9	79.3	52.6	30.5	84.9	15.1	26.3	10.2
20—21.9.....	4524	1673	4303	2671	70.7	137.5	55.8	63.6	44.2	71.7	90.6	42.1
22—23.9.....	3639	1968	2763	1324	82.4	116.9	36.2	15.1	41.2	22.0	32.6	151.1
24 and over	3116	969	2061	998	99.5	41.3	92.2	10.0	57.8	10.3	82.5	90.2
Sheep:												
13.9 and under....	975	1386	1133	982	30.9	21.6	8.8	.....	153.8	21.6	17.6	. .. .
14—15.9.....	3250	3561	2413	2160	24.6	2.8	4.1	13.9	43.1	16.8	29.0	18.5
16—17.9.....	2329	4097	1756	2580	4.3	12.2	5.7	15.5	81.6	14.6	28.5	31.0
18—19.9.....	2956	4546	1157	1535	84.6	17.6	8.6	6.5	54.1	28.6	17.3	6.5
20—21.9.....	2793	3021	2386	1900	10.7	3.3	4.2	15.8	75.2	13.2	20.9	.. ..
22—23.9.....	1256	1814	843	655	31.8	5.5	.....	.....	222.9	60.6	11.9	....
24 and over	1222	944	443	541	32.7	10.6	22.6	73.9	81.8	31.7	22.6	.. ..

TABLE 23.—Time in Transit. The Number of Crippled and Dead Hogs and Sheep by Single and Double Decks Compared by Six Month Periods From Oct. 1, 1926 to Sept. 30, 1927—Continued

Hours in transit	Receipts				Number per 10,000							
					Crippled				Dead			
	Oct.—Mar.		Apr.—Sept.		Oct.—Mar.		Apr.—Sept.		Oct.—Mar.		Apr.—Sept.	
	Singles	Doubles	Singles	Doubles	Singles	Doubles	Singles	Doubles	Singles	Doubles	Singles	Doubles
Part 2. Cars with losses												
Hogs:												
13.9 and under.....	3362	3248	10662	7346	157.6	126.2	80.7	119.4	71.4	9.2	24.4	58.5
14—15.9.....	5338	4075	6897	4949	207.9	144.8	104.4	123.4	69.3	36.8	44.9	70.7
16—17.9.....	5188	3262	5927	8882	169.6	156.3	97.9	117.1	96.4	36.8	21.9	46.2
18—19.9.....	4836	5231	6129	5784	200.6	131.9	84.8	117.6	107.5	22.9	39.2	81.3
20—21.9.....	5738	5236	7281	6716	162.1	137.5	79.7	147.4	59.3	53.5	29.8	125.1
22—23.9.....	4976	4485	5172	3848	158.8	122.6	88.9	106.5	96.5	44.6	73.5	78.0
24 and over	7891	5354	7069	6811	158.4	134.5	93.4	165.9	79.8	26.1	69.3	130.7
Sheep:												
13.9 and under.....	3543	5834	4431	1359	39.5	15.4	33.9	58.9	152.4	53.1	51.9	66.2
14—15.9.....	4433	6228	3053	2081	45.1	11.2	29.5	19.2	178.2	65.8	29.5	62.4
16—17.9.....	3096	6832	3433	1896	29.1	30.7	32.0	31.6	209.9	42.4	32.0	73.8
18—19.9.....	4420	6243	2986	2928	27.1	19.2	33.5	34.2	178.7	75.3	26.8	51.2
20—21.9.....	3753	4811	2908	2594	29.3	33.3	20.6	30.8	170.5	49.9	51.6	46.3
22—23.9.....	2710	3669	1153	945	36.9	27.3	.....	10.6	136.5	79.0	43.4	42.3
24 and over	4594	3419	2297	1903	28.3	26.3	13.1	26.3	145.8	73.1	60.9	141.9

Sheep.—Time in transit for single and double deck cars by seasons had varying influences. In the sample for October to November, the number of dead sheep was irregular both in singles and double decks. The amount of loss did not seem to be influenced by time in transit. This was true for the cars with losses the same as for the sample. In April to September the same tendency was noted, for both single and double decks. However, the losses during October to March were much higher in single deck cars than in double decks, for both the sample and cars with losses. As was the case with dead sheep the same tendency was noted in crippling. Time in transit had little or no effect as to crippling. However, in the period from October to March the percentage of crippled sheep was larger in single deck cars and in April to September in the double deck cars, for both the sample and cars with losses.

Thus time in transit made little difference in death and crippled losses, whether sheep and hogs were loaded in single or double decks. Altho the losses were lower in double than in single decks, in most instances the same tendencies were found as to time in transit.

TRANSFERRING AND THE EFFECT ON LOSSES

In marketing livestock it is not possible for all cars to be shipped over a single railroad, but some must be transferred to another, as many shipping points are located on railroads other than those going to a particular market. Then too, some shippers want to use certain railroads because of schedules maintained for livestock trains. This involves transferring from one railroad to another, and extra handling by the railroad crews, which may result in rough treatment, and delays, and thus affect losses.

To secure information on this subject the cars were sorted into groups, those that were transferred and those that were not transferred. The cars in the sample and the cars with only losses were used in this analysis.

Losses on sheep and hogs are presented; the data for calves and cattle were too limited to be conclusive, Table 24.

This table shows for the sample that there was little difference in crippling, the cars transferred having slightly more crippled than the cars not transferred. Likewise in the case of dead sheep there was little variation, but for dead hogs the loss was 80 percent greater for the sample in the transferred cars, being 42.3 and 23.4, respectively. The same general tendency is noted in the comparison of cars with losses. There was no difference in crippled

hogs, and in crippled and dead sheep, but the number of dead hogs was higher by 40 percent in the transferred cars. There was little variation in losses in transferred and non-transferred cars, except for hogs. Since this tendency was the same for the cars of the sample as all cars with losses it would seem that the hogs were not as able to stand transferring as were sheep. It might be well for all railroads to give careful consideration to cars that are transferred especially during the period of transfer.

TABLE 24.—Cars Transferred and Not Transferred. The Number of Crippled and Dead Hogs and Sheep in the Cars of the Sample and in the Cars With Losses for the Period Oct. 1, 1926 to Sept. 30, 1927

Species	Receipts		Number per 10,000			
			Crippled		Dead	
	Transferred	Not transferred	Transferred	Not transferred	Transferred	Not transferred
Sample						
Hogs	39,047	45,304	61.2	59.8	42.3	23.4
Sheep	26,673	29,752	14.2	10.8	42.1	44.7
Cars with losses						
Hogs	85,283	78,516	127.7	127.6	71.6	51.3
Sheep	52,453	51,479	30.1	25.2	90.6	90.3

Transferring increased the death rate more in doubles than in singles, Table 25. It made no difference whether hogs were loaded straight or mixed, the death loss was much higher in the transferred cars. This was true for both the cars in sample and the cars with losses. Thus loading cars straight when they must be transferred would reduce the death loss of hogs little, if any.

The loss from crippled hogs and sheep and from dead sheep showed little tendency for losses to be higher in transferred cars.

Transferring hogs in the winter had just as much influence on death loss as transferring in the summer. The same general proportion held for the cars in the sample and the cars with losses. No doubt, hogs have a tendency to "pile up" during winter when transferred and left to wait on a switch. Piling up usually results in an increased number of deads. In the summer transferred cars left on switch waiting for the next train often must withstand the heat of the sun. Hogs in cars on railroad sidings do not get the benefit of the air and breezes on hot days and night as they would from moving cars. Thus, as Table 26 shows, transferring is just as big a factor on death losses in winter as in summer.

TABLE 25.—Cars Transferred and Not Transferred. The Number of Crippled and Dead Hogs and Sheep in the Cars of the Sample and in the Cars With Losses by Single and Double Decks and Straight and Mixed Cars for the Period Oct. 1, 1926 to Sept. 30, 1927

Species	Single decks		Double decks		Straight		Mixed	
	Transferred	Not transferred	Transferred	Not transferred	Transferred	Not transferred	Transferred	Not transferred
Receipts								
Sample								
Hogs	26,740	24,102	12,307	21,202	10,917	17,230	28,130	28,174
Sheep	13,841	12,010	12,832	17,742	11,665	10,570	15,008	19,182
Cars with losses								
Hogs	46,307	35,380	38,876	43,136	24,641	22,672	60,542	55,844
Sheep	24,803	17,513	27,650	33,966	16,604	16,234	35,849	35,245
Crippled (number per 10,000)								
Sample								
Hogs	63.6	57.7	56.1	62.3	65.9	58.6	59.3	60.3
Sheep	8.7	11.7	20.3	10.1	10.2	7.5	17.3	12.5
Cars with losses								
Hogs	142.9	158.6	109.8	102.3	131.8	128.7	126.1	127.1
Sheep	33.0	30.8	27.5	22.4	27.1	20.9	31.5	27.2
Dead (number per 10,000)								
Sample								
Hogs	46.4	30.7	33.3	15.1	27.4	15.0	47.9	28.3
Sheep	62.1	64.9	23.4	31.0	28.2	10.4	55.3	63.6
Cars with losses								
Hogs	92.6	77.7	46.8	29.7	51.1	37.9	80.1	56.7
Sheep	136.2	147.3	49.5	60.9	69.8	56.0	100.1	106.1

TABLE 26.—Cars Transferred and Not Transferred. The Number of Crippled and Dead Hogs and Sheep in the Cars of the Sample and in the Cars With Losses by Six Month Periods From Oct. 1, 1926 to Sept. 30, 1927

	Winter (October-March)		Summer (April-September)	
	Transferred	Not transferred	Transferred	Not transferred
Receipts				
Sample				
Hogs	15,912	20,583	23,135	24,721
Sheep	15,980	19,597	9,643	10,155
Cars with losses				
Hogs	46,841	42,723	58,067	61,547
Sheep	43,285	43,747	22,770	23,048
Crippled (number per 10,000)				
Sample				
Hogs	84.8	85.0	44.1	34.7
Sheep	15.6	12.2	13.4	7.8
Cars with losses				
Hogs	118.0	122.6	92.3	74.9
Sheep	23.7	19.8	24.1	18.6
Dead (number per 10,000)				
Sample				
Hogs	40.2	22.8	38.0	20.2
Sheep	54.4	53.5	30.0	24.6
Cars with losses				
Hogs	58.1	32.1	56.1	40.2
Sheep	88.0	80.2	41.2	48.2

THE EFFECT OF WEIGHT OF CARS ON LIVESTOCK LOSSES

It is a generally accepted assumption among livestock shippers and others that overcrowding of livestock in cars affects the death and crippled losses. Two groups of cars were analyzed. The sample as gathered at the yards was used as one group, and all the cars with losses that arrived at Cleveland during the same period from the shipping points in Ohio, as the other group. The cars in each group were classed according to weight, length, number of decks, and nature of load, whether straight or mixed.

Four general classes were kept separate in the analysis. These were the single decks with straight loads, the single decks with mixed loads, the double decks with straight loads, and the double decks with mixed loads. The question of overcrowding or underloading of livestock in railroad cars has practically only one measure, the weight of the load.

To combine properly 36-foot and 40-foot cars a comparable grouping of weights had to be effected. To do this, minimum carload weights for each species of livestock and for each length of car were used as a guide. Since the receipts and losses of hogs and sheep were more numerous than of calves or cattle, such data were considered as being more representative, and hence in the grouping of different lengths of cars, the weights of cars for these two species were used as guiding factors.

For straight carloads, the following weight classifications were used to group the cars into light, medium, or heavy weight carloads:

It was assumed that hogs usually predominated in a mixed carload and consequently the weight classification for hogs should apply to the mixed loads of either sheep or hogs. Using this classification as a comparable basis for combining, the different lengths of cars as well as the various weights of loads were combined into light, medium, and heavy weight carloads, for determining the influence of weight in livestock cars.

When all cars were classed as light, medium, or heavy, the ratios of losses in the sample showed a definite tendency to increase as the weight of the load increased, Table 27.

TABLE 27.—Classification of 36- and 40-Foot Cars by Weight, pounds

Weight	36-feet	40-feet
Single decks, sheep		
Light	8,000 and less	9,000 and less
Medium	8,000 to 11,000	9,000 to 12,000
Heavy	11,000 and ove	12,000 and over
Double decks, sheep		
Light	14,000 and less	16,000 and less
Medium	14,000 to 20,000	16,000 to 22,000
Heavy	20,000 and over	22,000 and over
Single decks, hogs and other livestock		
Light	14,000 and less	15,000 and less
Medium	14,000 to 17,000	15,000 to 18,000
Heavy	17,000 and over	18,000 and over
Double decks, hogs and other livestock		
Light	22,000 and less	24,000 and less
Medium	22,000 to 28,000	24,000 to 30,000
Heavy	28,000 and over	30,000 and over

The ratios for cars with losses showed some variations from the tendency found in the sample. For instance, crippling of hogs increased with the increase of carload weight in the sample, but in the other group showed the reverse. Crippling was highest in the lighter loads and lowest in the heavier loads, which means that, when factors were present which make for crippling of hogs, more crippling was likely to occur in lightly loaded cars. However, the data for the sample and for the group of cars having losses agreed in the relationship between weights and the death of animals. Dead hogs showed this very well. The death rate increased greatly with the heavier loaded cars.

The medium weight loads of sheep showed the lowest ratio of crippling, the light loads ranked next, and the heaviest loads ranked highest.

When the data were analyzed on a basis of single and double deck cars the weight of load showed similar influences on losses. It made little difference whether cars were single deck or double deck, Table 32. The crippling of sheep, with few exceptions, in the cars in the sample as well as in the cars with losses seemed to increase as the weight of the load increased. This tendency held also for the crippling of hogs in the single deck cars of the sample. In the double deck cars of the sample, crippling was affected very little by weight of cars. In the cars with losses there was a definite tendency both in the single and double deck cars for crippling of hogs to be higher in the lightly loaded cars.

Death losses of hogs and sheep in most instances were higher for both the single and double deck cars when they were heavily loaded.

However, these losses were not as great in heavy loaded double deck cars as in single deck cars. As a general policy for shippers who wish to keep down losses it would seem that cars should not be loaded heavily. Loading sheep and hogs into straight or mixed cars made little difference on losses for the various weights of loads, Table 29. In nearly all instances the death loss was highest when the cars were heavily loaded. The data on crippling as previously noted were confusing when analyzed on a basis of weight of cars. If there be a tendency, it would seem to be higher for cars loaded lightly.

THE INFLUENCE OF NUMBERS OF HOGS PER CAR ON LOSSES

All straight cars were analyzed on the basis of number of hogs per deck as a factor in loss. Three divisions were made. The first group contained all decks that had under 50 hogs each, the second all from 50 to 70, and the third 70 and over. The influence of numbers on losses is presented in Table 29. The crippled loss averaged higher in both single and double deck cars loaded with a small number of animals. In all instances the number of cripples was lower in cars loaded with 70 or more to the deck. However, this was not true for death loss. Here the general tendency, with two exceptions, was for the number of deads to be higher in decks containing 70 or more hogs. In the 70-and-over group the highest death loss was found in single deck cars, while in the 50-70 group the death loss in the lower deck of double deck cars was large.

TABLE 28.—Light, Medium, and Heavy Loaded Cars. The Number of Crippled and Dead Hogs and Sheep in the Cars of the Sample and in the Cars With Losses for Single and Double Decks From Oct. 1, 1926 to Sept. 30, 1927

	Receipts			Number per 10,000					
				Crippled			Dead		
	Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
Sample									
Hogs, single deck	7,762	22,361	18,816	46.38	53.22	70.15	15.46	31.30	48.36
Hogs, double deck	7,309	17,143	9,194	53.36	61.25	57.65	9.58	19.83	30.45
Total	15,071	39,504	28,010	49.76	56.70	66.05	12.60	26.33	42.48
Sheep, single deck	10,074	10,850	3,149	7.94	16.59	38.11	89.34	42.40	73.04
Sheep, double deck	9,383	16,197	3,373	9.59	12.97	3.02	10.66	41.36	18.11
Total	19,457	27,047	6,462	8.74	14.42	20.12	51.40	41.78	60.35
Cars with losses									
Hogs, single deck	11,293	35,126	33,591	189.50	139.21	127.71	45.16	66.05	102.41
Hogs, double deck	14,206	39,387	30,435	126.71	119.96	75.24	31.68	39.86	37.46
Total	25,499	74,513	64,026	154.51	124.81	102.77	37.65	52.21	71.53
Sheep, single deck	15,924	19,132	12,095	45.21	38.16	155.45	148.83	133.28	180.83
Sheep, double deck	18,002	35,786	8,692	20.55	20.40	33.36	33.88	55.89	75.93
Total	33,926	54,918	20,787	32.13	26.58	47.14	87.84	83.95	115.45

TABLE 29.—Light, Medium, and Heavy Loaded Cars. The Number of Crippled and Dead Hogs and Sheep in the Cars of the Sample and in the Cars With Losses for Straight and Mixed Cars From Oct. 1, 1926 to Sept. 30, 1927

	Receipts			Number per 10,000					
				Crippled			Dead		
	Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
Sample									
Hogs, straight loads	4,475	14,410	7,376	42.46	63.15	58.30	4.47	16.66	35.25
Hogs, mixed loads	10,596	25,094	20,634	52.85	53.00	68.82	16.04	31.88	45.07
Sheep, straight loads	3,851	14,538	2,633	10.39	10.32	7.59	5.19	24.07	41.78
Sheep, mixed loads	15,606	12,509	3,829	8.33	19.19	28.73	62.80	62.36	47.01
Cars with losses									
Hogs, straight loads	7,334	24,709	10,435	140.44	129.50	196.75	29.99	39.66	51.75
Hogs, mixed loads	18,165	49,804	53,591	160.20	122.48	103.94	40.74	58.43	75.38
Sheep, straight loads	2,907	23,395	5,332	41.28	20.29	33.75	34.40	69.24	65.64
Sheep, mixed loads	31,019	31,523	9,564	31.27	31.40	103.51	92.84	92.95	151.61

TABLE 30.—Numbers and Hog Losses. The Number of Crippled and Dead Hogs in Straight Cars in the Sample by Six Month Periods From Oct. 1, 1926 to Sept. 30, 1927

	Receipts			Number per 10,000					
				Crippled			Dead		
	October to March	April to September	Year	October to March	April to September	Year	October to March	April to September	Year
Single deck cars									
Under 50	259	704	963	38.6	56.8	51.9	.....	.....	.....
50—69.9	3,170	3,076	6,246	72.6	35.8	54.4	22.1	16.3	19.2
70 and over	3,208	5,425	8,633	53.0	36.9	42.9	34.3	36.9	35.9
Double deck cars, lower deck									
Under 50	1,293	1,659	2,952	162.4	60.3	105.0	.....	12.1	6.8
50—69.9	2,514	4,517	7,031	99.4	59.8	74.0	8.0	57.6	39.8
70 and over	2,836	2,736	5,572	74.0	29.2	52.0	17.6	14.6	16.2
Double deck cars, upper deck									
Under 50	583	1,096	1,679	171.5	36.5	83.4	.....	9.1	6.0
50—69.9	1,863	1,464	3,327	32.2	34.2	33.1	5.4	.....	3.0
70 and over	465	874	1,339	64.5	11.4	29.9	64.5	11.4	29.9
Total cars									
Under 50	2,135	3,459	5,594	149.9	52.0	89.4	.....	8.7	5.3
50—69.6	7,547	9,057	16,604	71.6	47.5	58.4	13.3	34.2	24.6
70 and over	6,509	9,035	15,544	63.0	32.1	45.0	29.2	27.7	28.3

The different seasons had little effect on crippling as far as numbers per deck were concerned. That is, the same general tendency as found for the year was true for the two different seasons. The largest amount of crippling when less than 50 were loaded per deck was in the lower deck of double deck cars, Table 30. In the 50-70 and the 70-and-over groups, crippling in the lower deck was again high.

Just why the lower deck of double deck cars should average more crippling is hard to understand. It seems that crippling may be caused by not having a car sufficiently loaded, giving more opportunity for the hogs to move around, fight, and be thrown down when the cars were suddenly stopped or started.

EFFECT OF TEMPERATURE ON LOSSES

Livestock is marketed thruout the entire year and consequently must stand the extreme temperatures of the seasons.

TABLE 31.—Temperature. The Number of Crippled and Dead Hogs and Sheep in the Sample for Single and Double Deck Cars From Oct. 1, 1926 to Sept. 30, 1927

Temperature	Hogs		Sheep	
	Single deck	Double deck	Single deck	Double deck
Receipts				
10—29.9	4,049	2,193	3,012	3,747
30—49.9	15,099	11,912	10,517	14,443
50—69.9	14,899	9,814	5,839	5,203
70—89.9	14,476	10,080	4,836	5,805
Crippled (number per 10,000)				
10—29.9	93.8	95.8	6.6	24.0
30—49.9	73.5	87.3	15.2	9.0
50—69.9	32.9	27.5	8.6	15.4
70—89.9	42.1	31.7	4.1	8.6
Dead (number per 10,000)				
10—29.9	51.9	9.1	99.6	16.0
30—49.9	27.2	11.8	75.1	31.2
50—69.9	16.8	15.3	75.4	21.1
70—89.9	52.5	42.6	8.3	27.6

In analyzing the data on a basis of temperature the maximum temperature, as recorded by the weather bureau at Cleveland, for the day previous to arrival was used. Table 31 shows the variation in loss of dead hogs at different temperature class intervals during the period of the study. The loss for both single and double decks was much greater during the near zero temperatures and was much less for temperatures from 30 to 50 degrees. For the higher temperatures the death loss again increased for both double and single deck cars.

The loss due to crippling in hogs was much greater for the cold weather, running from 85 to 100 per 10,000, and gradually declined for the warmer temperatures, being lowest around 70 to 80 degrees. A slight rise occurred for the extreme hot weather.

Hogs were the only species of livestock that showed any appreciable variation consistent with temperature variation. Losses both from crippling and death among sheep, cattle, and calves showed little or no relation to temperature. For sheep the death loss was highest from 50 to 60 degrees and lowest from 60 to 80 degrees in single deck cars. The death loss did not seem to follow any differences in temperature.

The data for cattle and calves were limited because of the small losses.

THE EFFECT OF FOOTING ON LOSSES

Upon arrival at Cleveland the cars included in the sample were judged as to footing by the observer who filled out the schedules. Cars with floors which were slippery so that animals had difficulty in standing when they walked about were classed as poor footing. In such cars livestock were often thrown off their feet when the cars were stopped. On the other hand, cars which were not slippery so that livestock could stand and not fall down, were considered as having good footing. The cars that were judged to be between these two groups were considered as having fair footing.

Not all cars arrived at Cleveland with good footing. Occasionally some came in, which were so slippery that animals had difficulty in walking. However, most cars had fair footing. Many shippers hold the view that slippery floors will have more animals down with a resulting higher loss than cars with good footing. See Table 32.

The crippled loss in most cases was slightly lower in cars that had good footing, and the death loss was lower in all. However, there were no outstanding differences and footing did not seem to have as great an influence as would be supposed.

As far as death loss of hogs was concerned there was little difference between the good footing and the fair and poor footing for the period October to March, inclusive. However, the loss was considerably lower for crippled hogs when the footing was good. For the period April to September the number of crippled hogs was about the same for the different kinds of footing, but the number of dead hogs was smaller for the good footing. There was little difference between the two periods in number of crippled sheep on the different footings. The loss of dead sheep was higher for good footing for spring and summer period and lower for fall and winter.

TABLE 32.—Condition of Footing. The Number of Crippled and Dead Animals in the Cars in the Sample, by Seasons From Oct. 1, 1926 to Sept. 30, 1927

Footing	Cattle			Calves			Hogs			Sheep		
	October to March	April to September	Total for year	October to March	April to September	Total for year	October to March	April to September	Total for year	October to March	April to September	Total for year
Receipts												
Poor	851	401	1,252	2,127	1,746	3,873	15,174	17,273	32,447	8,760	5,604	14,364
Fair	222	167	389	1,006	847	1,853	6,748	6,196	12,944	5,471	2,858	8,329
Good	408	564	972	1,734	2,088	3,822	16,158	20,441	36,599	21,244	11,289	32,533
			2,613			9,548			81,990			55,226
Crippled (number per 10,000)												
Poor	47.0	.....	31.9	14.1	5.7	10.3	92.9	45.7	67.8	14.8	8.9	12.5
Fair	180.2	.....	102.8	0	.....	.....	80.0	46.8	64.1	12.8	.....	8.4
Good	24.5	17.7	20.6	5.8	.....	2.6	73.6	43.5	56.8	11.3	7.1	9.8
Dead (number per 10,000)												
Poor	47.0	24.9	39.9	42.3	5.7	25.8	29.7	34.7	32.4	114.2	16.1	75.9
Fair	.....	.....	.....	.....	.....	.....	23.7	59.7	40.9	43.8	51.4	32.4
Good	49.0	.....	20.6	23.1	.....	10.5	30.3	27.9	29.0	32.9	31.0	32.3

TABLE 33.—Bedding. The Number of Crippled and Dead Animals in the Cars in the Sample for All Temperatures From Oct. 1, 1926 to Sept. 30, 1927

Kinds of bedding	Receipts				Number per 10,000							
					Crippled				Dead			
	Cattle	Calves	Hogs	Sheep	Cattle	Calves	Hogs	Sheep	Cattle	Calves	Hogs	Sheep
No bedding	337	2,475	22,462	10,249	29.7	8.1	50.8	14.6	89.0	16.2	36.1	23.4
Straw	1,627	4,905	37,622	34,282	55.3	6.1	75.2	11.4	6.1	16.3	34.3	48.1
Cinders	158	652	6,355	1,170	.....	.....	39.3	8.5	.....	.....	20.5	17.1
Sand and gravel	82	535	6,779	1,942	122.0	.....	51.6	10.3	122.0	.....	13.3	20.6
Coal	35	256	2,198	506	.....	39.1	50.0	.....	.....	.....	22.7	19.8
Dirt	29	154	1,273	649	.....	344.8	117.8	46.2	.....	.....	70.7	77.0
Other	262	641	5,983	5,167	38.2	.....	53.5	5.8	38.2	15.6	35.1	27.1
Total	2,530	9,618	82,672	53,965	.....	.....	.....	.....	.....	.....	.....	.....

In nearly all instances death and crippled losses were lower in cars that arrived with good footing.

BEDDING AND LOSSES

The crippling for the entire period was greatest in cars bedded with dirt for calves, hogs, and sheep. The death loss was likewise highest in dirt bedded cars for hogs and sheep Table 33. Dirt was an unsatisfactory bedding, and was used very little by shippers, less than 2 percent of each species coming to market bedded with dirt.

TABLE 34.—Bedding. The Number of Crippled and Dead Hogs and Sheep in the Cars in the Sample Compared in Temperature Groups Under 50° and Over 50° From Oct. 1, 1926 to Sept. 30, 1927

Kind of bedding	Receipts		Number per 10,000			
			Crippled		Dead	
	Hogs	Sheep	Hogs	Sheep	Hogs	Sheep
10° to 50°						
No bedding	4,859	4,638	82.3	25.9	22.6	23.7
Straw	24,039	22,538	88.2	11.5	19.6	58.1
Cinders	442	173	90.0	.....	45.2	.....
Sand and gravel	172	47	174.4	.....	.....	.....
Other	2,365	3,919	97.3	12.8	33.8	40.8
Total	31,877	31,315	.....	.....	.....	.....
50° to 90°						
No bedding	17,603	5,611	42.0	5.3	39.8	23.2
Straw	13,583	11,744	52.3	11.1	60.4	29.0
Cinders	5,914	997	35.5	10.0	18.6	20.1
Sand and gravel	6,607	1,895	48.4	10.6	13.6	21.1
Other	7,089	2,403	49.4	4.2	42.3	12.5
Total	50,796	22,650	.....	.....	.....	.....

Bedding can be analyzed better when the shipments are divided into two temperature groups, above 50 and below 50 degrees, as shown in Table 34. For the cars in the temperature group below 50 degrees, the number of crippled hogs was greatest when they were bedded with sand and gravel. However, the number of cars so bedded was small. Less than 1 percent of the hogs and sheep were bedded, on sand and gravel which are a warm weather bedding. The number of crippled hogs was lowest in cars with no bedding, followed closely by cars bedded with straw. Cars with no bedding had the greatest number of crippled sheep and cars bedded with straw the smallest. Hogs had the lowest death

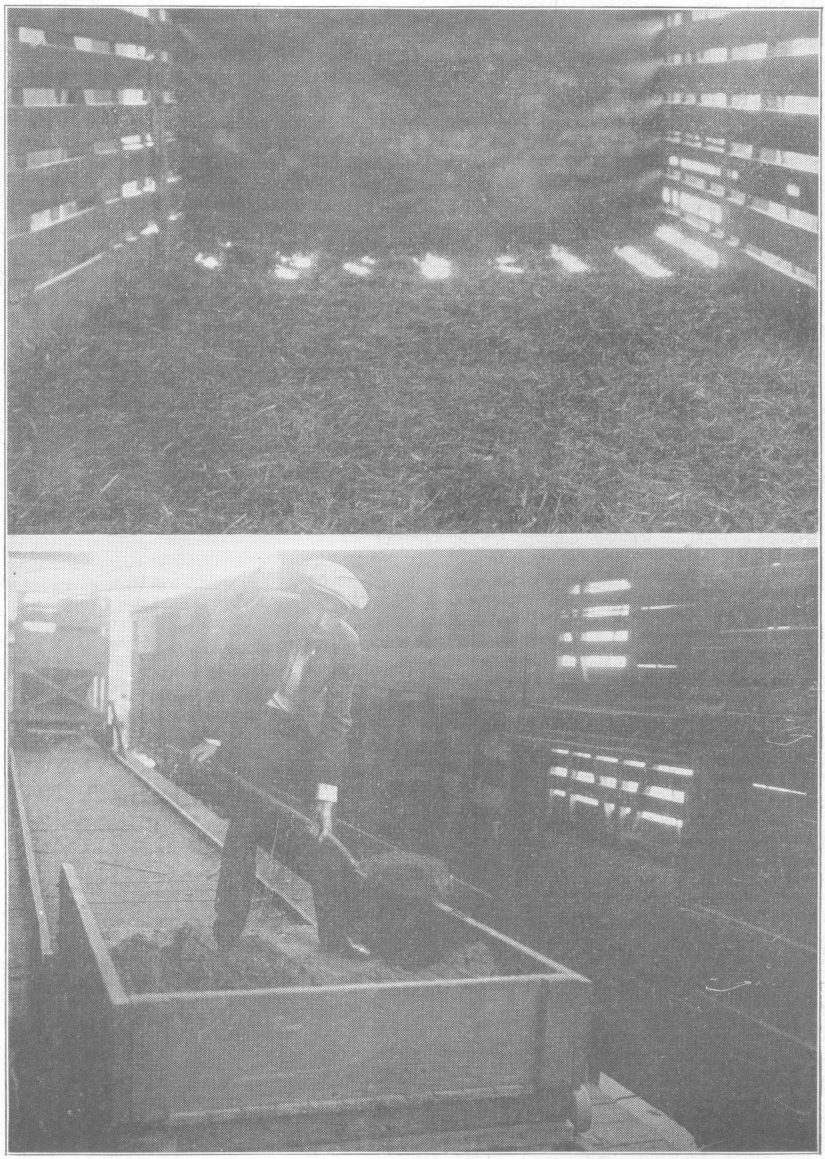

Fig. 11.—The car above is properly bedded with straw, an ideal cold weather bedding. The car below is bedded with sand, which will reduce losses during hot weather

loss when bedded with straw, and the highest when bedded with cinders. The lowest death loss for sheep was in cars with no bedding, and highest in cars with straw bedding.

When the temperature was above 50 degrees, cars bedded with cinders had the smallest number of crippled hogs, and cars with miscellaneous bedding had the smallest number of crippled sheep. Fewest hogs were dead with sand and gravel bedding and most with straw bedding. Fewest sheep were dead in the miscellaneous bedded cars and most in straw-bedded cars. Sand and gravel as well as cinders had very few losses.

This would seem to show that for temperature above 50 degrees straw is an unsatisfactory bedding for either sheep or hogs. On the other hand sand and gravel were satisfactory as a bedding for temperatures above 50 degrees. This was also true for cinders. However, cinders are so unsatisfactory for other reasons they cannot be classed with sand and gravel.

Only 13 percent of the hogs and 8.4 percent of the sheep came in cars bedded with sand and gravel. Since this kind of bedding was the better its use should be encouraged. Furthermore, 26.7 percent of the hogs and 51.8 percent of the sheep arrived in cars bedded with straw in the warmer period. The use of straw in the warmer months should be discouraged. Bedding did not have the same effect for the group under 50 degrees as it did for the higher temperature group. Straw was about the most satisfactory bedding used at the lower temperature.

Cars bedded with cinders, sand, and gravel showed the highest percentage of good footing, while cars with no bedding at all showed the lowest percentage, Table 35.

When the cars were divided into temperature groups above and below 50 degrees a different tendency was noted. For the colder period cars bedded with straw or other material such as corn fodder, chaff, grass, and hay gave the highest percentage of good footing. Cars with no bedding had the lowest percentage of good footing.

Less than 1 percent of the cars arrived for this period bedded with sand and gravel.

A much higher percentage of cars came in with good footing for the warmer period. Cinders, sand and gravel, and other material had the highest percentage of cars with good footing. The lowest percentage of good footing was in cars with no bedding. However, it does not seem that footing has such an influence on

TABLE 35.—Bedding. The Number and Percentage of Cars in the Sample Compared as to Condition of Footing for Temperatures Above and Below 50° From Oct. 1, 1926 to Sept. 30, 1927

Kinds of bedding	Number of cars				Percent			Percent of total cars
	Poor	Fair	Good	Total	Poor	Fair	Good	
All temperatures								
No bedding	232	53	42	327	70.9	16.2	12.8	23.4
Straw	224	124	382	730	30.7	17.0	52.3	52.1
Cinders	15	8	65	88	17.0	9.1	73.9	6.3
Sand and gravel	11	16	63	90	12.2	17.8	70.0	6.4
Others	32	21	113	166	19.3	12.7	68.1	11.8
Total	514	222	665	1401	36.7	15.8	47.5	100.0
10° to 49°								
No bedding	63	16	8	87	72.4	18.4	9.2	14.0
Straw	153	84	231	468	32.7	17.9	49.4	75.4
Cinders	4	1	2	7	57.1	14.3	28.6	1.1
Sand and gravel	1	1	0	2	50.0	50.0	0.0	0.3
Others	14	8	35	57	24.6	14.0	61.4	9.2
Total	235	110	276	621	37.8	17.7	44.5	100.0
50° to 90°								
No bedding	169	37	34	240	70.4	15.4	14.2	30.8
Straw	71	40	151	262	27.1	15.3	57.6	33.6
Cinders	11	7	63	81	13.6	8.6	77.8	10.4
Sand and gravel	10	15	63	88	11.4	17.0	71.6	11.3
Others	18	13	78	109	16.5	11.9	71.6	14.0
Total	279	112	389	780	35.8	14.4	49.9	100

losses as some other factors, for cars with no bedding did not have exceptionally high losses except when the temperature was below freezing.

CONDITION OF BEDDING

Some cars of livestock, upon arrival at the market, were in exceptionally good condition as far as bedding was concerned, while others were in very unsatisfactory condition, Table 36. In crippled animals, the losses of hogs were lowest in floors arriving in a sloppy condition and highest on those that were steamy. However, the number of animals arriving with steamy bedding was small, being less than 2 percent of the total. The condition of the bedding seemed to have little influence on crippled loss. The same was true for death loss in hogs. With few exceptions there was a higher loss in the steamy and slippery floors than in dry, wet, or damp floors. The loss for dead sheep ran highest in the steamy and damp floors. Of the hogs in the sample group, 31.9 percent came

TABLE 36.—Condition of Bedding. The Number of Crippled and Dead Animals for Cars in the Sample From Oct. 1, 1926 to Sept. 30, 1927

Condition of bedding	Cattle	Calves	Hogs	Sheep
Receipts				
Dry	480	3,094	26,727	28,826
Damp	852	3,118	24,229	12,068
Wet	927	3,003	26,537	11,385
Sloppy	163	511	4,795	804
Steamy	26	119	1,410	642
Crippled (number per 10,000)				
Dry	41.7	6.5	61.4	10.8
Damp	46.9	6.4	59.0	9.9
Wet	43.2	6.7	64.9	11.4
Sloppy	61.3	.....	31.3	12.4
Steamy	.....	.....	106.4	.....
Dead (number per 10,000)				
Dry	.....	3.2	34.0	34.7
Damp	23.5	3.2	29.7	85.3
Wet	43.1	30.0	29.7	37.8
Sloppy	61.3	19.6	41.7	24.9
Steamy	.....	.....	42.6	93.5

in dry, 1.7 percent steamy, 5.7 percent sloppy, 31.8 percent wet, and 28.9 percent damp. The cars were fairly evenly divided as to dry, damp, and wet bedding.

SHOWERING OF CARS AND LOSSES COMPARED FOR DIFFERENT KINDS OF BEDDING

During the warmer weather cars are generally showered in transit at various points by the railroads. This is done to make the livestock, particularly hogs, more comfortable. None of the cars were showered when the temperature was below 50 degrees; most of the showering was at 70 degrees or above.

TABLE 37.—Cars Showered and Not Showered. The Number of Crippled and Dead Animals in the Cars in the Sample Above 50° on Arrival From Oct. 1, 1926 to Sept. 30, 1927

	Cattle	Calves	Hogs	Sheep
Receipts				
Cars not showered	946	3,854	33,786	18,940
Car showered	306	1,578	17,009	3,710
Crippled (number per 10,000)				
Cars not showered	21.1	2.6	47.1	10.0
Cars showered	.....	6.3	43.5	2.7
Dead (number per 10,000)				
Cars not showered	10.6	7.8	47.4	21.6
Cars showered	32.7	.....	24.7	40.4

The crippled loss was lower for hogs and sheep in cars that were showered, but higher for calves. The death loss for hogs was twice as much in cars not showered, whereas the loss for sheep was the reverse, being about twice as high for cars showered. This

would lead one to the conclusion that showering lowered the death loss on hogs, but had very little influence on the number of crippled hogs. Sheep were better off not showered. This would also seem to be true for cattle and calves. See Table 37.

The death loss on hogs averaged nearly as high in straw-bedded cars that were showered as in those not showered, Table 38. The same tendency was noted for sand and gravel. Cars with cinders, other bedding, and no bedding had much lighter losses when showered. The loss for dead sheep was greatest with all bedding when showered, save sand and gravel, which was about the same. For cinders, sand and gravel and other bedding the loss on crippled hogs was higher when the cars were showered. For straw and no bedding the crippled hog loss was higher in cars not showered.

TABLE 38.—Cars Showered and Not Showered. The Number of Crippled and Dead Hogs and Sheep in the Cars in the Sample Compared as to Kinds of Bedding, Above 50° on Arrival From Oct. 1, 1926 to Sept. 30, 1927

Kinds of bedding	Receipts		Number per 10,000			
			Crippled		Dead	
	Hogs	Sheep	Hogs	Sheep	Hogs	Sheep
Cars showered						
No bedding	5,418	1,042	31.4	.....	25.8	38.4
Straw	1,873	660	42.7	.....	58.7	90.9
Cinders	3,265	565	36.8	17.7	9.2	35.4
Sand and gravel	3,742	962	56.1	.....	13.4	20.8
Other	2,711	481	59.0	.....	29.4	20.8
Total	17,009	3,710	.....	.....	.....	.....
Cars not showered						
No bedding	12,185	4,569	46.8	6.6	46.0	19.7
Straw	11,710	11,084	53.8	11.7	60.6	25.3
Cinders	2,648	432	34.0	.....	30.2	.....
Sand and gravel	2,865	933	38.4	21.4	14.0	21.4
Others	4,378	1,922	43.4	5.2	48.0	10.4
Total	33,786	18,940	.....	.....	.....	.....

Showering made the car floors wet and naturally tended to make them slippery, but in spite of this tendency the crippled loss was lower for hogs. This would seem to show that crippling was due to some other factors than to slipperiness of floors. This was especially true during the warmer months when the showering was done, Table 39.

TABLE 39.—Cars Showered and Not Showered. The Number and Percentage of Cars in the Sample Compared as to Condition of Footing for Various Kinds of Bedding, Above 50° on Arrival From Oct. 1, 1926 to Sept. 30, 1927

Kind of bedding	No. of cars				Percent			Percent of total cars
	Poor	Fair	Good	Total	Poor	Fair	Good	
Cars showered								
No bedding	62	10	1	73	84.9	13.7	1.4	31.6
Straw	15	3	7	25	60.0	12.0	28.0	10.8
Cinders	6	3	37	46	13.0	6.5	80.4	19.9
Sand and gravel	8	9	33	50	16.0	18.0	66.0	21.7
Others	9	3	25	37	24.3	8.1	67.6	16.0
Total	100	28	103	231	43.3	12.1	44.6	100
Cars not showered								
No bedding	107	27	33	167	64.1	16.2	19.8	30.4
Straw	56	37	144	237	23.6	15.6	60.8	43.2
Cinders	5	4	26	35	14.3	11.4	74.3	6.4
Sand and gravel	2	6	30	38	5.3	15.8	78.9	6.9
Others	9	10	53	72	12.5	13.9	73.6	13.1
Total	179	84	286	549	32.6	15.3	52.1	100

EFFECT OF FEEDING HOGS IN TRANSIT ON LOSSES

The practice of shippers in feeding hogs in transit varies. Some shippers feed, while many do not. Some farmers when shipping cooperatively insist that the manager feed the hogs in the cars. This is done because it is thought hogs fed will have a lower shrink. However, in checking cars which contained 83,000 hogs, it was found that only 15 percent were fed, the rest were either not fed or were fed so little that it was not possible to determine accurately this fact upon their arrival at Cleveland.

TABLE 40.—Hogs Fed and Not Fed at Time of Shipment. The Number of Crippled and Dead in the Cars in the Sample for Six-month Periods Oct. 1, 1926 to Sept. 30, 1927

	Percent for the year	Number per 10,000					
		Crippled			Dead		
		Winter	Summer	Total	Winter	Summer	Total
Hogs fed	84.6	101.2	27.0	71.4	31.2	46.4	37.3
Hogs not fed	15.4	75.5	45.8	58.7	30.1	34.4	32.5

The data on crippling, Table 40, do not show a definite tendency in the effect of feeding, being higher in winter for feeding but lower in summer. The weighted average for the year was

higher for hogs that were fed. However, with deads, the information showed little tendency toward heavier losses when hogs were fed. There was little or no difference during the winter months but there was a 34 percent heavier loss during the summer.

Hogs that are fed probably are not able to withstand transportation as well as those not fed because in many instances the stomachs are over extended from feed. It was not possible to ascertain the degree of feeding, hence in the not-fed group there were numerous cars that were lightly fed. This must be considered in making comparisons.

CLEANED AND UNCLEANED CARS

It is the generally accepted practice of shippers to market livestock in cleaned cars. However, it was found in this study that exactly one-third of all cars received were not cleaned, Table 41.

TABLE 41.—Cleaned and Uncleaned Cars. The Number of Crippled and Dead Animals in the Cars in the Sample From Oct. 1, 1926 to Sept. 30, 1927

	Cattle	Calves	Hogs	Sheep
Receipts				
Cleaned cars	1,814	6,681	56,612	40,517
Uncleaned cars	634	3,181	27,347	13,411
Crippled (number per 10,000)				
Cleaned cars	49.6	4.5	58.6	11.1
Uncleaned cars	31.5	9.4	65.5	9.7
Dead (number per 10,000)				
Cleaned cars	27.6	12.0	27.7	47.1
Uncleaned cars	31.5	15.7	41.0	49.2

The crippled loss was higher for cattle and sheep in the cleaned cars and lower for calves and hogs, altho there was not much difference between cleaned and uncleaned cars. The number of dead animals was greater in all cases except sheep in the uncleaned cars. Uncleaned cars seemed to have the greatest influence on the death loss on hogs. For cattle the number received was too small to be of any great significance.

With few exceptions the loss averaged higher in the uncleaned cars than in the cleaned when analyzed on a single and double deck basis, Table 42. The exceptions were in crippled cattle for the single deck cars, and crippled and dead sheep for double deck cars. However, in all instances both the cripple and death losses for hogs were higher in the uncleaned cars, single and double decks. The number of cattle received was very small and probably the data were not representative. The numbers of hogs and sheep received

were sufficiently large so that the information should be representative, and it emphasizes the importance of shipping hogs in cleaned cars.

TABLE 42.—Cleaned and Uncleaned Cars. The Number of Crippled and Dead Animals in the Cars in the Sample Compared by Single and Double Decks From Oct. 1, 1926 to Sept. 30, 1927

	Single deck		Double deck	
	Cleaned	Uncleaned	Cleaned	Uncleaned
Receipts				
Cattle	1,814	634	.....	.....
Calves	4,142	2,367	2,539	814
Hogs	31,767	18,401	24,854	8,946
Sheep	17,883	6,807	22,634	6,604
Crippled (number per 10,000)				
Cattle	49.6	31.5	.....	.....
Calves	4.8	12.8	3.9	.....
Hogs	57.9	67.4	59.6	61.5
Sheep	10.1	11.8	11.9	7.6
Dead (number per 10,000)				
Cattle	27.6	31.5	.....	.....
Calves	19.3	21.1	.....	.....
Hogs	35.3	43.5	18.1	35.8
Sheep	66.5	80.8	31.8	16.7

GRADES OF HOGS

Hogs marketed at Cleveland were not uniform in grades. More than one-third, 35.1 percent, came to market with several grades to the car, 64.9 percent arrived with uniform grades to the car, Table 43. The greatest percentage of any one grade for the period studied was medium hogs, and the next highest yorkers. A small percentage of light hogs was received. It is noticed that better than one-third of the receipts were of mixed grade, which means that mediums and heavies or other grades were mixed together in the cars.

TABLE 43.—Grades of Hogs. The Number of Crippled and Dead Hogs in the Cars in the Sample Compared by Single and Double Decks From Oct. 1, 1926 to Sept. 30, 1927

	Mixed	Heavies	Mediums	York	Lights
Receipts					
Single deck	18,345	7,862	12,396	9,525	1,640
Double deck	10,593	6,392	10,034	5,694	.....
Total	28,938	14,191	22,430	15,219	1,640
Percent of total	35.1	17.2	27.2	18.5	2.0
Crippled (number per 10,000)					
Single deck	55.1	85.2	58.9	49.3	36.6
Double deck	46.3	67.9	86.7	38.6	.....
Total	51.8	77.5	71.3	45.3	36.6
Dead (number per 10,000)					
Single deck	43.6	48.3	27.4	31.5	61.0
Double deck	28.3	7.9	15.9	36.9	.....
Total	38.0	30.3	22.3	33.5	61.0

The cripple loss for both single and double deck cars combined was greater among the heavy and medium than among the lighter hogs. The same tendency, with few exceptions, held for single and double decks. In one case the heavies had the high loss, followed by mediums; while in the other case, mediums had the greater loss, followed by heavies. The combined total of single and double deck cars showed that the greatest death loss was in the lights, the mixed yorkers and heavies next in order, and the medium grade least. From the data it would appear that the lighter hogs were more likely to die in transit than the heavier animals. Likewise, in mixed loads the loss was higher, which may have been due to the lighter animals in the loads. The death loss on heavies and mediums was rather high in single deck cars and was very low in double deck cars. This would seem to indicate that heavies and mediums probably can withstand transportation better in double deck cars where more room is available than in single deck cars.

EFFECT OF ROUGHS AND STAGS ON LOSSES

Slightly less than one-half of the hogs marketed came in without roughs or stags in the load. In many instances roughs and stags were received without being partitioned from the other hogs in the car, but usually they were properly partitioned, Table 44.

TABLE 44.—With and Without Roughs and Stags. The Number of Crippled and Dead Hogs in the Cars in the Sample Compared by Single and Double Decks From Oct. 1, 1926 to Sept. 30, 1927

	Single deck	Double deck	Total
Receipts			
Without roughs and stags	23,155	16,486	39,641
With roughs and stags	26,613	16,164	42,777
Crippled (number per 10,000)			
Without roughs and stags	52.7	71.8	60.5
With roughs and stags	64.2	51.3	59.4
Dead (number per 10,000)			
Without roughs and stags	38.9	18.8	30.5
With roughs and stags	37.9	25.4	33.2

It was apparent that the cripple loss was affected but little by roughs or stags. The loss was much lower in double deck cars with roughs and stags, and higher in single decks. The number of deads per 10,000 was about the same for single deck cars, but was higher for double decks, which makes the combined total slightly more for cars loaded with roughs and stags than for cars without.

In Table 49 the loss among hogs is compared by grade for cars received with and without roughs and stags. Here it is noticed

that the data are conflicting. For heavies and mixed, the cripple loss was higher in cars with roughs, but lower for yorks and lights. There were more deads in the cars containing roughs and stags in the heavy, mixed, and yorkers, but fewer for the mediums and lights. The number of light hogs was too small to give a fair indication of this grade and the information should not be considered representative. From these data it would seem that the methods followed in the shipping of roughs and stags had very little influence on the amount of crippled and death losses at Cleveland. This means that they were properly partitioned when they were of a size that would cause damage to the other hogs in the car. It would seem that other factors are more important than roughs and stags in causing hog losses.

TABLE 45.—With and Without Roughs and Stags. The Number of Crippled and Dead Hogs in the Cars in the Sample Compared by Grades From Oct. 1, 1926 to Sept. 30, 1927

	Heavies	Mediums	Mixed	York	Lights
Receipts					
Without roughs and stags	7,896	12,190	11,432	7,356	767
With roughs and stags	6,295	10,270	17,476	7,863	873
Crippled (number per 10,000)					
Without roughs and stags	67.1	72.2	48.1	54.4	52.2
With roughs and stags	90.5	70.3	54.4	36.9	22.9
Dead (number per 10,000)					
Without roughs and stags	25.3	23.0	37.6	29.9	104.3
With roughs and stags	36.5	21.5	38.4	36.9	22 9

INTERPRETATION AND CONCLUSIONS

In making this study at the terminal market at the time of unloading from the cars, only part of the factors contributing to dead and crippled animals could be studied. It was not possible to know how or what the livestock was fed on the farms previous to shipping. Likewise no information was available as to the treatment received from the time the livestock left the farm until it was loaded into the cars. Then very little information could be secured on losses contributed by the railroads. Thus some of the loss from animals that arrived crippled and dead may have been due entirely or in part to some of the factors mentioned above. The analysis and the various comparisons show how some phases of livestock marketing that could be observed at the time of unloading at Cleveland may contribute to the cripple and death losses. In addition many facts and characteristics of losses are presented. From this approach one can understand more clearly the material that has been presented.

Comparisons show the losses at Cleveland to be similar to those of Pittsburgh, Buffalo, and the eleven western markets. Thus it may be assumed that the losses at Cleveland were fairly typical of those of the other markets.

More hogs were crippled than either sheep, cattle, or calves. The legs of hogs are not as strong, relatively, as the legs of other species. Most of the crippling of hogs occurred in the hind legs. One method of keeping down crippling is to produce hogs with stronger legs. This, no doubt, means the right kind of feeding, including the proper proportion of minerals. Breeding, too, can assist in producing hogs with stronger bone. Hogs, both crippled and dead, showed more seasonal variation than cattle or calves. Dead sheep showed about the same variation as crippled hogs. The winter and spring months were high in death loss of hogs, while the late summer and early autumn months were low. More hogs were crippled during the winter and fewer during August, September, and October.

There are several reasons for more crippled and dead hogs during the winter. In cold weather there is a tendency for hogs to pile up to keep warm. This results in crippling. A crippled hog with a pile of hogs on top usually means a dead hog before the market is reached. Hogs marketed during the winter are dry fed. Many dry-fed hogs do not have the right kind of feed to produce strong bone. Consequently many are crippled or dead upon arrival at the market.

The single deck was more conductive to losses than the double deck. The principal reason for this was crowding, especially in mixed cars that were partitioned. Many shippers were careless in partitioning. They did not distribute the space evenly for each of the species. Accordingly the car might seem to be properly loaded as to weight, but the animals back of the partition be crowded resulting in loss. This was more noticeable in single than in double decks, for the shippers usually had to load tighter to get the minimum weights on which rates are figured. Double deck cars had relatively more space to make the minimum weights and shippers did not partition so tightly. Partitioning is one phase of livestock marketing that should be given more consideration by livestock shippers and interested agencies.

Most of the partitioned cars were mixed, that is, had two or more species in a car; while the unpartitioned cars were usually straight, having only one species in a car. However, some straight cars came to market with partitions. The results of the study

rather clearly favor the shipment of sheep and hogs in straight cars. The difference between straight and mixed was greatest in the single deck cars. In doubles there was more available space per animal, with less need for crowding and overloading. When doubles are partitioned more space can likewise be given for the animals behind the partition, and livestock so loaded will be more comfortable and less restless while on the road.

The principal agencies sending livestock to Cleveland were cooperatives and livestock buyers. As an average for the year, the livestock buyers had more crippled cattle and hogs and dead cattle, the cooperatives more dead calves, hogs, and sheep and crippled sheep.

No doubt the reason for higher death losses for cooperatives was the practice of shipping out all livestock received for a particular shipping date. Many times this resulted in overloading the cars. On the other hand, buyers often held over some of the livestock purchased until the next shipment and loaded out the cars to the number and weight which in their judgment seemed best. This meant lighter loaded cars with less chance of loss from deaths.

It was also found that the livestock buyers were better hot weather shippers than the cooperatives when shipping hogs. Many of the buyers had been in business for a long time and were more particular during hot weather. Some carried their own insurance, while cooperatives had an insurance fund out of which to pay losses.

The cooperatives had heavy death losses in sheep during the winter months, the livestock buyers had higher losses during April and May. The reasons for these variations are not readily apparent.

Only part of the livestock sent to Cleveland went directly to the yards without being transferred. When a car was transferred it remained on a railroad siding until moved by a train of the railroad to which it was transferred. Transferring made no difference in cripple losses but greatly increased the number of dead hogs. The losses were just as great during the winter as summer. The reasons for this are probably two. During the summer months cars were left standing on sidings in the sun making the hogs hot and uncomfortable, resulting in more deaths. Often these cars were not showered and were switched along the side of other cars or between two strings of cars. These conditions should be given careful consideration by those responsible.

During the winter months hogs in cars that were transferred and left standing on sidings became restless, especially if it was very cold and windy. This caused "piling up". Hogs shipped during the colder months should have warm bedded cars, which can easily be provided by the shippers. Shipping in straight or mixed, singles or doubles, made no difference in the hog death loss when the cars were transferred.

Another factor which is somewhat related to transferring in affecting losses is time in transit. This factor was most important during the spring and summer and affected hogs most. During the warmer months, the longer hogs were in transit the higher were the death losses. This ordinarily would be expected, for the cars when they leave the point of origin are usually in their best shipping condition. In the summer the floors are wet down and the train usually pulls the car out shortly after they are loaded. After the first few hours, time becomes an important factor in the warmer months. The floors lose their moisture unless the proper bedding is used. Livestock trains do not run to market without some stopping. Often cars are transferred, which usually means some delay. These are contributing factors to less satisfactory conditions, and are probably some of the reasons for the higher death rate for the longer time in transit.

The greatest number of crippled hogs during the summer months ordinarily may be expected within 25 hours after the shipment begins. In fact most of the crippling occurred within that time. That most of the factors contributing to crippling had their effect within the first 25 hours is shown by a study of the tables. A hog once crippled has a good chance to be trampled and otherwise injured, so that a hog crippled a few hours after having been shipped out more than likely will be dead upon arrival at the market. Crippling, therefore, would contribute to death losses. The study indicates such a relationship. However, time in transit during the autumn and winter months did not seem to have as definite an influence as during the spring and summer months. Time in transit should be considered by all shippers who are 15 or more hours from market. Likewise railroads should keep this factor in mind, for the delays encountered in transit contribute to losses. The influence of time on the road is such that shippers near the market sometimes "get by" with careless shipping. The study shows that time in transit is a much less important factor for sheep.

The study in general points to the fact that heavy loading of cars is not advisable. There were some exceptions in the various comparisons. On the other hand neither should cars be loaded too lightly. Single deck 36-foot cars much in excess of 17,000 pounds and double deck cars over 28,000 pounds carrying principally hogs, hogs and calves, hogs and sheep, or all three species, can ordinarily be expected to have higher death losses than cars carrying less weight. There are many exceptions which point otherwise, but from an analysis of a large number of cars heavier losses can be expected from overloading.

When cars were lightly loaded, either from the standpoint of weight or number of animals, ordinarily the number of cripples was increased. The happy medium seemed little in excess of the minimum car weights on which railroad rates are figured. From the standpoint of losses it was better to be slightly under the minimum car weights. However, if the weight was very much under, the extra freight charge from too light loading more than exceeded the losses from heavier loading. Livestock should be given proper room. This means loading to the weight and number per car that will ride well. There are so many factors to be considered, such as weight per head, number, degree of mixture of species, and time of year, that definite rules cannot be arbitrarily laid down. The study pointed out rather clearly that excessive or heavy loading should be avoided. While the shipping expense was slightly reduced in heavy loaded cars the death loss as an average was high.

Altho temperature did not affect the losses for the other species of livestock, it had some influence on hog losses, but there were also other factors that influenced hog losses. The correlation was very low when worked out on a day-to-day basis and slightly higher for weeks. Extreme changes in temperature had considerable influence on losses. For example, during May 20 to 21, 1927 the temperature was around 60°. Then it started to rise and on May 23 reached a high point of 80°. Shippers did not anticipate such a change, the hogs were not acclimated to hot weather and the result was a loss of 205 dead for each 10,000 received. However, after the shippers prepared for hot weather and the hogs became acclimated, the loss was small. It is the extremes in temperature which should be guarded against in shipping hogs.

Crippling of hogs was very high during cold weather. It was during the cold months that hogs which had been dry fed came to market. No doubt many were fed a very meager amount or no

minerals at all. This, no doubt helped increase the cripple loss during cold weather. More cars with poor footing came in during the cold weather, and this also may have helped raise the crippled loss. However, footing was not as important in the cars that were analyzed as one might expect, altho footing was a more important factor during the winter months than during the summer.

Straw bedding was probably the best bedding for cold weather and sand or sand and gravel for warm weather. More than 70 percent of the hogs and sheep receipts had straw bedding when the temperature was under 50 degrees, while 26 percent of the hog and 51 percent of the sheep receipts had straw bedding with the temperature higher than 50 degrees. The highest losses for both hogs and sheep during the warmer period was found in straw bedded cars. Straw was a satisfactory cold weather bedding but should not be used during the warm months. The cars carrying hogs and sheep and bedded with straw should be greatly reduced during the warm weather. Bedding during the winter and colder weather does not seem to be such an important factor. The cars during the winter months which had a small amount of sand scattered on the floor and then bedded with plenty of straw were among the best bedded cars observed during the winter months. From all angles sand seemed to be the best bedding for the warm and hot weather.

Showering was of most importance in reducing the death loss of hogs, especially during the warm weather. It was of no value to cattle and calves and with sheep the death loss was higher when the cars were showered.

Cripple losses were somewhat lower in the showered cars, altho not as outstanding as the death loss in hogs. Showering did not reduce appreciably the death loss of hogs in cars bedded with straw, nor with sand. It was principally in the cars bedded with other material.

Showering during warm weather cools off the hogs so they are more comfortable and stand the journey to market in better condition. It also increases the slipperiness of the floors, but apparently slipperiness did not increase the number of cripples.

Showering in general is a good practice during warm weather for hogs but is of no value for calves, cattle, and sheep. Then too in cars bedded with sand the hog losses were little different whether the cars were or were not showered. This again points out the fact that sand is the bedding to use during hot weather. No doubt one of the chief reasons why showering sand bedded cars

made little difference in death loss of hogs is due to the fact that sand when once wet down retains the moisture for considerable time. Shippers usually wet the cars thoroly before loading in the hot weather and as a result the sand remains damp for a large part of the journey to market. Hogs shipped in such cars are comfortable, do not get over heated, stand shipping better and the death loss is much lower.

Another factor which the shipper influences directly is feeding in the cars after loading out. Feeding is practiced only with hogs. During the winter feeding made little difference in death loss, but during the summer the death loss was one-third higher when the hogs were fed. No information was available as to the amount of feed given but all the cars which had been heavily fed at time of shipment were included. Some of the cars which were fed very little when loaded may have been classed as not being fed, because only those cars about which there was no question about feeding were classed as having been fed. It would seem from this that shippers should avoid feeding especially in the summer time. A hog that has any large amount of feed in its stomach is made uncomfortable, and restless, and as a result it gets hot which makes for conditions to cause higher death losses.

Ordinarily one would expect that nearly all livestock cars would be cleaned before shipment but approximately one-third of the cars coming to the Cleveland market had not been cleaned previous to loading. Again this practice had the greatest influence on hogs. On the other species no influence was noted. The hog death loss was 50 percent higher in the uncleaned cars. Here is another factor with reference to hog losses livestock shippers can directly influence.

The largest amount of crippling occurred among the medium and heavy weight hogs while more dead hogs were found in the cars carrying mixed grades. Some exceptions were found but the above would be the general conclusion from the study. Hogs of the heavier weights are not able to withstand jars from starting and stopping railroad trains, loading and unloading as well as the lighter more active hogs. This would be expected and was found to be true in the study. The death loss was highest in the cars carrying mixed grades. When light, medium and heavy weight hogs are shipped together the chances are greater for heavier losses. Another course, upon which little information was secured, contributing to livestock losses in shipment is the care given by the

railroads. Livestock trains at times are handled unusually rough by the railroad crews. Occasionally such rough treatment is unavoidable, but in many cases it can be avoided.

Cars of livestock were observed at times during the course of the study which from all appearances were loaded in the best possible manner yet would have a fairly high loss. Feeding no doubt contributes some of this unexplainable loss, but on the other hand the railroads have contributed in many instances thru rough handling of the livestock cars.

Some of the shippers which had heavy losses during the period of the study were interviewed. They told of instances when the livestock was thrown against the ends of the car when the cars were fastened to the train or were being switched. Other experiences, which in many instances may be biased against the railroads, would seem to indicate that the livestock trains could be handled less roughly and with more care, and would in all probability help reduce the losses.

The engineers of the livestock trains are the seat of the difficulty of rough handling and further study with the engineer chiefly in mind, rather than the shipper as was the case in this study, might reveal very interesting information.

The transfer problem and its influence has been previously pointed out. This livestock loss factor is entirely in the hands of the railroads. Neither the producer of livestock nor the shipper can have much influence on this point. It should be given earnest consideration by the railroads.

The railroads also should have their showering equipment ready to function when the first extreme hot weather comes in the spring usually in May. With both shippers and railroads watching for the extreme temperature changes livestock losses, especially hog losses, can be greatly reduced.

The time in transit difficulty can be influenced to some extent by the railroads. This is of most importance during the summer as was previously mentioned. Whenever delay can be reduced they should assist in reducing losses. When schedules on livestock trains are maintained there is little chance for delay, with the exception of transferring. Of course, there is always the question of economy. It may be more expensive from the standpoint of the railroad to materially change the handling of livestock trains then to pay for the livestock losses encountered thru claims.

There is another cause of livestock losses which is important and has considerable bearing on livestock losses in transit. It is the kind of feed and rations the livestock has received during production. The livestock producer that does not feed properly will in most instances market livestock which will not stand shipping as well as livestock fed the proper rations.

There is plenty of information available on feeding, rations, etc. which points out this importance. The Ohio Experiment Station along with other institutions has done extensive research along this line. When improperly fed livestock is loaded by cooperative associations, livestock buyers, or other, such agencies stand good chances of having rather heavy losses.

In fact instances are known when the crippled and dead hogs taken from a car arriving at market have been traced back to a particular farm. However, as long as the livestock marketing agencies stand the financial loss of crippled and dead animals there will be little incentive for the livestock producer to produce livestock which will reduce losses.

Livestock losses, in conclusion, can be reduced to some extent by each of several agencies, the livestock producer, the livestock shipper (cooperative and private), and the railroads. To get the greatest amount of reduction requires the cooperation of all of these above named agencies. Consequently the work of such organizations as the Ohio Livestock Loss Prevention Association should go forward as it is attempting to attack the problem from the standpoint of all interested agencies.

TABLE 46.—Total Receipts and Number of Crippled and Dead Animals Arriving at Cleveland and at Buffalo for the Four Years, 1924-1927—Continued

Month	Receipts, total number				Crippled per 10,000				Dead per 10,000			
	Cattle	Calves	Hogs	Sheep	Cattle	Calves	Hogs	Sheep	Cattle	Calves	Hogs	Sheep
Cleveland												
January	44,654	42,824	377,874	163,141	9.85	3.73	58.06	10.54	5.15	17.98	27.01	43.33
February	37,072	37,013	270,978	92,477	8.36	5.40	52.32	15.57	6.74	8.91	22.62	57.52
March	37,439	48,356	325,472	122,440	8.01	4.13	42.41	9.22	4.28	9.09	20.21	22.62
April	34,251	58,263	298,055	150,154	8.46	3.26	39.82	7.05	3.21	7.20	24.22	12.32
May	32,724	60,532	304,354	92,882	4.88	3.46	36.86	9.58	4.29	7.26	27.10	14.64
June	36,548	54,845	272,559	60,216	5.19	2.00	32.50	8.30	1.09	8.38	20.14	13.28
July	40,583	51,884	229,790	49,232	4.18	1.73	25.84	4.06	2.95	6.55	17.53	10.15
August	44,727	49,217	224,096	79,079	5.81	1.82	19.09	4.93	2.01	8.12	15.61	14.66
September	50,374	47,274	264,851	153,783	4.56	3.80	16.61	4.87	3.77	8.67	17.59	25.88
October	49,453	45,957	308,395	207,304	5.05	3.69	16.82	5.16	1.81	8.05	12.93	22.38
November	44,052	39,642	294,284	243,559	8.39	3.27	23.00	4.76	4.99	10.34	10.39	24.05
December	42,574	40,625	360,253	203,235	5.40	3.93	40.94	8.11	3.99	10.83	19.87	36.65
Buffalo												
January	49,412	66,125	516,195	431,427	15.7	20.7	62.2	21.6	6.6	21.0	37.9	26.2
February	38,307	62,844	389,745	380,361	14.1	18.9	55.1	23.1	7.0	20.6	28.4	28.9
March	37,751	73,934	368,899	315,475	11.4	18.9	49.4	23.3	6.8	17.7	24.7	18.8
April	40,376	84,892	364,387	299,272	11.4	19.5	43.5	20.1	7.6	12.0	27.2	11.0
May	44,117	85,393	351,943	265,533	9.0	19.1	33.6	31.7	4.0	12.1	32.4	9.1
June	45,192	81,376	337,318	74,064	7.3	19.0	34.9	25.5	4.8	16.8	28.3	15.9
July	50,381	64,537	296,650	67,718	6.3	17.3	24.7	23.7	2.2	14.4	21.4	22.7
August	52,724	52,568	321,823	103,191	8.5	20.3	16.5	29.5	3.9	10.5	19.8	31.0
September	54,264	45,088	366,637	196,143	8.4	13.5	18.8	21.7	4.2	12.9	29.2	26.6
October	73,209	51,545	496,682	291,015	9.2	16.5	20.6	20.5	3.8	10.5	27.8	26.3
November	70,524	53,222	469,704	316,351	9.0	18.6	34.9	23.2	4.2	16.1	13.0	34.8
December	48,530	55,680	464,741	349,734	16.1	18.7	53.7	22.3	6.2	18.5	26.8	34.8

TABLE 47.—Total Receipts* and Number of Dead Animals per 10,000 Arriving at Pittsburgh and for the Eleven Markets for the Four Years, 1924-1927

Month	Receipts, total number				Dead per 10,000			
	Cattle	Calves	Hogs	Sheep	Cattle	Calves	Hogs	Sheep
Pittsburgh								
January	147,569	154,560	1,070,787	288,270	2.17	8.02	15.05	17.96
February	116,438	124,892	837,693	244,985	1.88	4.88	10.30	10.49
March	114,504	128,703	761,167	292,792	1.39	5.98	9.97	11.57
April	119,701	143,431	713,386	322,143	1.75	3.69	12.27	7.66
May	129,687	157,318	781,513	373,715	1.54	3.62	10.08	5.83
June	129,702	143,289	657,822	450,821	1.77	5.44	14.77	2.92
July	163,930	144,681	599,120	490,231	1.46	5.52	12.43	2.67
August	180,270	162,220	614,575	423,920	1.71	4.37	10.15	8.44
September	174,477	153,050	725,028	333,846	2.80	5.03	12.27	17.58
October	198,504	149,007	900,643	261,253	1.71	4.22	11.21	11.36
November	180,432	131,961	922,555	207,586	2.77	5.83	7.31	21.77
December	152,318	152,287	961,173	270,045	1.57	5.12	9.72	15.25
Eleven markets								
January	3,982,138	890,784	13,079,445	4,093,687	10.1	58.7	5.8	15.9
February	3,148,653	801,562	10,446,995	3,809,894	8.1	44.5	11.6	14.4
March	3,582,101	966,964	10,900,271	4,413,766	5.9	39.8	9.6	10.0
April	3,377,049	940,642	8,361,377	3,678,478	5.2	37.5	15.0	5.7
May	3,714,506	1,001,196	8,663,266	3,548,876	4.5	33.1	11.4	3.2
June	3,592,015	988,376	9,132,866	3,555,652	4.6	29.8	13.2	3.9
July	3,788,414	975,575	8,011,028	3,482,306	4.5	27.9	10.0	6.4
August	4,508,092	1,134,241	6,976,264	4,689,358	4.0	22.0	10.3	7.8
September	5,600,567	1,179,377	6,291,411	7,320,070	4.2	23.2	11.1	7.6
October	6,114,426	1,412,518	7,511,075	7,789,169	5.1	23.8	10.2	10.0
November	5,158,994	1,253,481	9,328,714	4,303,373	8.4	30.1	7.5	13.7
December	4,984,212	1,005,120	11,725,456	4,054,234	8.3	45.9	15.7	13.7

*Total receipts include livestock sold on the market and livestock stopped for feed and water. Hence, the number of dead per 10,000 is somewhat lower than for other markets with which Pittsburgh is compared.

TABLE 48.—The Total Receipts and the Number of Crippled and Dead Hogs at Cleveland for the Four Years, 1924 to 1927 by Months

Month	Receipts, total number				Crippled per 10,000				Dead per 10,000			
	1924	1925	1926	1927	1924	1925	1926	1927	1924	1925	1926	1927
January	128,488	118,976	65,328	65,082	53.6	34.5	105.3	70.4	39.3	16.2	29.5	22.4
February	88,941	84,372	48,942	48,723	58.8	30.6	83.7	55.7	30.4	18.8	21.4	19.5
March	125,537	64,712	65,948	69,275	40.5	34.4	67.4	47.5	19.5	22.0	24.1	21.1
April	107,615	62,651	65,876	61,913	36.2	27.2	56.9	56.0	27.3	27.5	25.0	19.7
May	110,940	56,842	62,533	74,039	37.9	24.1	50.5	43.7	20.4	17.2	54.5	37.3
June	97,850	50,388	49,281	75,040	32.5	22.0	47.2	37.5	26.0	17.1	19.2	16.9
July	81,817	37,745	51,911	58,317	26.8	14.1	37.4	27.7	21.4	11.1	22.2	14.8
August	70,342	44,682	53,806	55,266	16.3	12.3	29.8	22.0	16.1	22.2	18.8	8.7
September	83,627	55,052	69,907	56,265	11.6	13.0	26.2	18.3	15.0	18.0	26.9	12.4
October	101,590	68,694	78,808	59,303	11.9	18.7	24.0	19.7	11.4	11.8	22.0	10.6
November	121,436	63,192	41,504	68,152	12.1	43.1	36.2	24.9	8.0	10.4	18.2	11.4
December	151,177	77,414	47,332	84,330	25.0	72.1	67.1	37.4	22.2	25.0	24.9	13.7

TABLE 49.—The Total Receipts and the Number of Crippled and Dead Sheep at Cleveland for the Four Years, 1924 to 1927 by Months

Month	Receipts, total number				Crippled per 10,000				Dead per 10,000			
	1924	1925	1926	1927	1924	1925	1926	1927	1924	1925	1926	1927
January	32,744	32,898	36,003	61,496	11.4	11.8	12.1	10.6	66.2	42.3	37.0	48.4
February	15,307	17,458	24,831	34,881	18.4	9.4	11.9	15.1	80.8	39.6	51.7	41.9
March	23,443	24,983	31,838	42,176	9.3	9.5	8.4	12.4	38.2	13.7	25.4	23.3
April	25,659	40,923	43,599	39,973	5.3	7.4	7.9	10.0	15.9	10.3	13.5	16.1
May	19,264	30,300	19,291	24,027	10.3	13.8	11.7	6.6	17.8	11.0	27.4	15.2
June	12,982	15,220	16,695	15,319	12.9	1.3	7.7	11.3	20.9	11.9	15.3	13.9
July	12,606	14,488	10,796	11,342	1.7	4.9	7.0	6.3	17.6	7.0	12.8	10.0
August	17,872	21,737	17,754	21,716	4.0	2.8	2.3	9.6	24.0	12.5	13.0	17.5
September	34,271	48,599	28,478	42,435	4.6	5.2	4.6	5.6	36.0	23.6	37.7	18.3
October	59,015	53,428	40,650	54,211	8.6	4.7	3.5	3.3	28.0	25.3	31.0	19.5
November	69,379	57,681	61,876	54,623	4.5	4.6	6.8	4.7	26.8	21.1	41.7	17.9
December	42,280	57,840	61,252	41,863	12.4	9.8	7.1	8.1	66.4	37.2	34.1	30.1

TABLE 50.—The Total Receipts and the Number of Crippled and Dead Calves at Cleveland for the Four Years, 1924 to 1927 by Months

Month	Receipts, total number				Crippled per 10,000				Dead per 10,000			
	1924	1925	1926	1927	1924	1925	1926	1927	1924	1925	1926	1927
January	10,472	12,337	10,149	9,866	3.8	1.6	4.8	7.7	21.4	15.6	23.8	21.8
February	8,903	10,391	9,626	8,093	9.1	2.0	5.0	9.7	9.1	6.9	8.7	17.8
March	12,561	12,595	12,048	11,152	3.2	4.3	6.1	6.8	10.4	7.7	12.3	13.6
April	15,612	15,343	14,269	13,039	4.1	2.0	3.4	6.3	10.1	3.3	12.0	8.4
May	16,418	15,999	14,844	13,271	5.5	3.1	4.0	1.9	8.0	3.8	8.8	13.3
June	13,076	15,502	14,557	11,710	0.8	2.6	1.5	4.1	11.9	10.1	5.4	9.1
July	13,848	16,766	12,481	8,789	0.8	3.0	0.9	1.3	10.6	6.6	6.3	2.7
August	13,010	14,610	11,010	10,587	1.6	2.8	3.0	0.0	8.0	7.8	9.1	11.0
September	12,372	13,128	12,127	9,647	2.6	8.9	3.6	6.2	6.1	13.7	7.4	10.3
October	12,513	12,802	10,632	10,010	3.4	8.8	1.1	.9	9.2	15.8	6.9	2.9
November	10,861	9,083	10,967	8,731	1.9	5.9	5.2	2.2	6.8	15.4	19.9	5.7
December	10,677	11,652	10,426	7,870	0.9	7.9	4.9	1.2	14.2	7.9	8.7	6.3

TABLE 51.—The Total Receipts and the Number of Crippled and Dead Cattle at Cleveland for the Four Years, 1924 to 1927 by Months

Month	Receipts, total number				Crippled per 10,000				Dead per 10,000			
	1924	1925	1926	1927	1924	1925	1926	1927	1924	1925	1926	1927
January	12,767	10,853	9,765	11,269	8.8	9.4	13.6	10.5	6.4	0.9	10.2	7.0
February	10,958	8,464	8,469	9,181	6.4	11.8	8.4	10.7	4.6	7.1	14.1	5.3
March	10,034	9,577	9,506	8,322	5.0	10.5	13.4	5.7	3.0	1.1	9.7	5.7
April	9,281	8,116	9,121	7,733	7.6	6.3	10.1	14.3	3.2	7.5	1.3	1.6
May	7,836	8,809	9,077	7,002	5.1	5.7	9.2	1.8	5.1	2.3	5.3	7.1
June	8,981	11,681	8,719	7,167	5.8	4.3	2.6	11.4	3.5	0.0	1.3	0.0
July	9,597	13,627	9,599	7,760	2.1	5.2	3.5	7.3	3.2	2.2	5.8	1.4
August	10,187	14,378	8,728	10,434	4.0	2.8	7.9	2.1	3.0	1.4	4.0	1.1
September	12,873	13,231	9,927	9,341	2.4	4.7	10.8	4.3	3.2	5.5	4.3	4.2
October	5,985	14,634	10,206	10,798	2.0	5.2	5.5	9.2	3.3	3.5	2.2	0.0
November	13,184	9,996	12,265	8,607	13.3	5.1	8.6	8.1	3.9	6.1	7.8	3.5
December	12,500	11,311	11,233	7,530	9.2	7.0	5.4	3.9	0.9	4.7	7.6	5.3

TABLE 52.—Single Deck and Double Deck Cars. The Number of Crippled and Dead Animals Received at Cleveland From Ohio Shipping Points From Oct. 1, 1926 to Sept. 30, 1927

Month	Receipts, total number				Crippled per 10,000				Dead per 10,000			
	Cattle	Calves	Hogs	Sheep	Cattle	Calves	Hogs	Sheep	Cattle	Calves	Hogs	Sheep
Single deck cars												
October	3,514	2,554	35,069	15,072	14.2	3.9	30.5	5.3	5.7	15.7	23.7	31.2
November	5,904	4,913	21,534	23,837	13.5	10.2	42.7	9.6	13.5	28.5	24.1	70.1
December	4,099	4,024	18,646	21,386	12.2	5.0	88.5	7.9	17.0	12.4	41.3	49.6
January	4,440	4,144	23,637	18,710	15.8	9.7	78.3	12.8	9.0	33.8	31.5	68.4
February	4,342	3,115	17,286	12,096	13.8	6.4	91.4	20.7	6.9	19.3	30.7	79.4
March	5,255	4,864	22,771	12,326	7.6	8.2	59.3	16.2	5.7	16.4	34.3	36.5
April	4,256	5,570	24,229	12,382	14.1	3.6	66.0	8.9	2.3	7.2	28.5	23.4
May	4,086	5,637	29,616	7,936	2.4	.....	50.3	8.8	7.3	19.5	42.9	11.3
June	3,302	4,223	33,222	4,840	12.1	2.4	37.0	10.3	.....	11.8	22.9	18.6
July	3,574	3,252	27,583	4,448	8.4	.....	29.0	9.0	.....	.....	22.5	11.2
August	4,090	3,030	21,972	7,504	4.9	.....	25.5	6.7	2.4	9.9	10.5	17.3
September	3,664	2,230	23,803	14,978	5.5	9.0	18.9	7.3	8.2	9.0	14.7	24.7
Total	50,526	47,556	299,368	155,517	10.5	4.8	48.6	10.3	6.9	16.0	27.0	44.4
Double deck cars												
October	.....	1,596	22,078	14,273	.....	0.0	20.4	2.1	.....	.....	19.5	24.5
November	.....	1,606	11,650	22,869	.....	0	27.5	2.2	.....	12.5	10.3	14.0
December	.....	2,404	12,576	27,428	.....	4.2	82.7	6.6	.....	8.3	14.3	21.9
January	.....	1,996	17,600	30,511	.....	0	96.0	9.8	.....	.....	19.9	28.5
February	.....	1,716	12,105	18,917	.....	11.7	54.5	13.2	.....	.....	19.0	22.7
March	.....	1,948	18,295	20,403	.....	0	58.5	11.8	.....	5.1	22.4	17.6
April	.....	2,848	20,363	18,112	.....	14.0	47.6	11.6	.....	3.5	11.8	13.3
May	.....	3,973	26,189	11,250	.....	5.0	45.4	5.3	.....	7.6	38.9	17.8
June	.....	2,889	26,667	5,904	.....	3.5	37.9	13.6	.....	3.5	11.6	10.2
July	.....	1,342	16,828	3,055	.....	0	33.3	3.3	.....	.....	5.9	6.5
August	.....	1,782	15,592	7,811	.....	0	22.4	14.1	.....	.....	11.5	20.5
September	.....	1,502	20,083	15,153	.....	0	27.4	5.9	.....	.....	13.4	22.4
Total	.....	25,602	220,026	195,686	.....	3.9	44.8	8.2	.....	3.9	17.6	20.2

TABLE 53.—Partitioned and Unpartitioned Cars From Ohio. The Number of Crippled and Dead Animals Received at Cleveland Shipped From Ohio Shipping Points From Oct. 1, 1926 to Sept. 30, 1927

Month	Receipts, total number				Crippled per 10,000				Dead per 10,000			
	Cattle	Calves	Hogs	Sheep	Cattle	Calves	Hogs	Sheep	Cattle	Calves	Hogs	Sheep
Partitioned cars												
October	1,289	3,621	33,925	18,431	23.3	2.8	27.1	4.9	15.5	5.5	22.1	25.5
November	2,167	6,235	22,300	23,224	13.8	6.4	47.1	9.9	.....	22.5	23.3	65.0
December	1,945	6,089	19,096	21,511	20.6	3.3	93.7	9.8	15.4	11.5	37.7	57.6
January	2,220	5,909	23,429	17,401	18.0	6.8	80.7	16.7	13.5	22.0	32.9	82.8
February	1,724	4,709	18,025	10,866	17.4	8.5	84.9	24.8	11.6	12.7	30.7	89.3
March	2,281	5,663	24,814	11,397	8.8	3.5	69.3	20.2	8.8	12.4	37.1	42.1
April	1,720	6,323	25,232	11,729	29.1	7.8	63.4	13.6	.....	7.8	28.9	29.8
May	1,348	8,272	29,459	9,508	7.4	2.4	47.5	6.3	7.4	15.7	51.6	22.1
June	1,381	5,894	30,550	8,245	21.7	3.4	41.9	15.8	.....	10.2	21.6	18.2
July	1,171	3,652	23,317	6,112	17.1	.....	33.0	8.2	.....	.....	22.7	8.2
August	1,364	3,968	19,705	12,170	.....	.....	29.4	13.1	7.3	5.0	12.2	18.1
September	874	3,167	22,961	17,785	11.4	6.3	23.5	9.0	22.9	3.2	14.4	30.9
Unpartitioned cars												
October	2,225	529	23,222	10,914	9.0	.....	25.8	1.8	.....	37.8	22.0	32.0
November	3,738	284	10,884	23,482	13.4	35.2	17.5	2.1	21.4	70.4	11.0	20.4
December	2,154	339	12,126	27,303	4.6	29.0	74.2	5.1	18.6	.....	19.0	15.4
January	2,220	231	17,808	31,820	13.5	.....	92.7	7.9	4.5	43.3	18.0	22.3
February	2,618	122	11,366	20,149	11.6	.....	62.5	11.4	3.8	.....	17.6	20.8
March	2,974	1,151	16,252	21,332	6.7	17.4	42.6	9.8	3.4	17.4	16.6	15.5
April	2,536	2,095	19,360	18,765	3.9	4.8	50.1	8.5	3.9	.....	10.3	9.6
May	2,737	1,338	26,346	9,678	.....	.....	49.1	7.2	7.3	7.5	29.2	8.3
June	1,921	1,218	29,339	2,499	5.2	.....	32.7	.....	.....	.....	14.0	.....
July	2,403	942	21,094	1,391	4.2	.....	28.0	.....	.....	.....	9.0	14.4
August	2,726	844	17,859	3,145	7.3	.....	18.5	.....	.....	11.8	9.5	22.3
September	2,790	565	20,925	12,346	3.6	.....	22.0	3.2	3.6	17.7	13.9	13.0

TABLE 54.—Losses for Cooperatives and Livestock Dealers. The Number of Crippled and Dead Hogs and Sheep by Months in the Cars of the Sample for the Period Oct. 1, 1926 to Sept. 30, 1927

Month	Receipts		Crippled per 10,000		Dead per 10,000	
	Cooperatives	Livestock dealers	Cooperatives	Livestock dealers	Cooperatives	Livestock dealers
Hogs						
January	2,950	3,873	122.0	103.3	16.9	38.7
February	2,551	2,912	70.6	130.5	39.3	6.9
March	2,509	3,009	67.8	93.1	23.9	13.3
April	4,918	2,955	48.8	74.5	32.5	40.6
May	3,906	3,892	41.0	46.2	89.6	15.4
June	3,596	4,722	58.4	40.2	61.2	25.4
July	2,062	3,061	53.3	26.1	58.2	29.4
August	1,976	2,421	10.1	41.3	70.8	16.5
September	3,269	2,203	6.1	22.7	27.5	31.8
October	3,214	5,006	28.0	38.0	28.0	57.9
November	1,754	1,933	91.2	36.2	17.1	25.9
December	1,384	2,018	65.0	109.0	36.1	49.6
Sheep						
January	3,454	5,687	.....	14.1	92.6	36.9
February	1,633	4,317	18.4	9.3	67.3	25.5
March	1,910	3,460	20.9	23.1	52.4	26.0
April	2,447	3,834	16.3	2.6	20.4	31.3
May	1,093	2,221	.....	36.0	9.1	31.5
June	1,104	1,532	27.2	.....	36.2	6.5
July	471	78	.....	.....	21.2	.....
August	1,115	1,247	.....	32.0	17.9	24.0
September	1,831	2,391	.....	8.4	54.6	20.9
October	1,471	1,902	34.0	.....	20.4	21.0
November	2,645	2,597	11.3	3.9	56.7	80.9
December	2,325	1,733	21.5	11.5	98.9	57.7